MAY 4, 1988
VOLUME 22, NUMBER 18A
$2/COPY, $44/YEAR

COMPUTERWORLD

FOCUS

Getting the message across

CW 17952638 8010203564F71 DIR
J BROWN
UNIV MICROFILMS INTERNATL
300 N ZEEB RD
ANN ARBOR MI 48106

The hidden costs of networks
The sub-LAN subculture
Global systems management
Special Section: AT&T vs. IBM networking

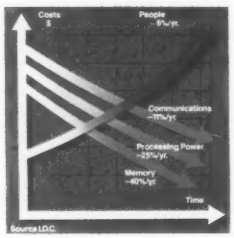
Connectivity on a grand scale

We're the largest independent networking company. Which is surprising since we've spent the past 25 years merging with AT&T, IBM and DEC.

For over 25 years, Codex has been dedicated to doing one thing well – providing networking solutions to meet any communications need.

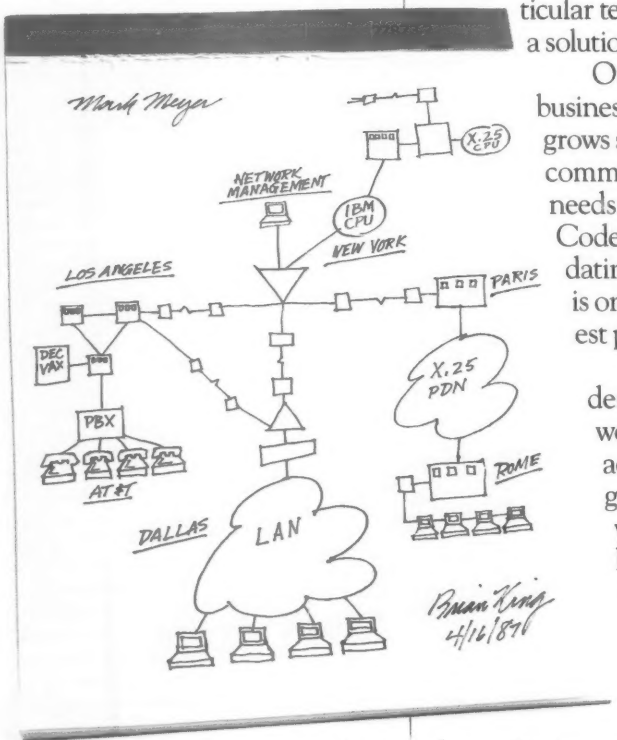
We're not a computer company. We're not a phone company. Data communications is, and always has been, our only business. So we can maximize the performance and functionality of all the pieces of your network, regardless of which vendors they come from.

As a result, our communications solutions are perfect for multi-vendor environments.



We can show you how a Codex network can be more profitable and more productive for your company.

And since our capabilities include everything from all types of transmission devices to gateways to network management systems, we're never trying to force fit a particular technology into a solution.



At Codex, we don't have set solutions – we work with your current environment. Which is why we spend a lot of time drawing diagrams like this.

Of course, as your business changes and grows so will your communications needs. And, at Codex, accommodating that growth is one of our highest priorities.

In fact, we design our networks so that they actually spark growth within your company – helping to drive it by being a vital and powerful corporate resource.

To do this, we've invested an enormous amount of time and money into R & D. We've also been very active in industry standards committees helping to create the kind of "open architecture" that will allow you to link equipment from many vendors in a more productive way.

All of this is the reason Codex is the preferred brand of data communications professionals. And why 97% of the Fortune 100 use Codex equipment.

Of course, besides working for successful companies we're also backed by a successful company – Motorola.

So if you've got a network requirement and you're looking for someone to help you equip it, expand it, and give you the tools to manage it worldwide, Codex is the company to deal with.

When we say we wrote the book on networking, we mean it. Literally.

To find out what Codex can do for *your* applications and to order a free copy of our informative guide – *The Basics Book of Data Communications*, give us a call at **1-800-426-1212, Ext. 250.** Or write Codex Corporation, Dept. 707-50, Maresfield Farm, 7 Blue Hill River Road, Canton, MA 02021-1097.

codex

MOTOROLA

The Networking Experts

See us at ICA, Booth 1480

© 1987 Codex Corporation. Motorola and (M) are trademarks of Motorola, Inc. Codex is a registered trademark of Codex Corporation.
IBM is a registered trademark of International Business Machines Corp. DEC is a registered trademark of Digital Equipment Corporation. AT&T is a registered trademark of American Telephone and Telegraph Co.
Sales offices in more than 40 countries worldwide. In Europe call 32-2-6606980, in Canada 416-791-5700, in the Far East 852-5-666706 (in Japan 81-3-3848810), in the Americas 617-364-2000.

Circle Reader Service Number 1

in focus

THE AGONY OF EXPENSE

Picture this: You have your dream network in place and running smoothly, and everyone is pleased, from top management to users. Just when you can see that bonus check in the bank, your worst fears are realized; unexpected, unbudgeted costs turn up. Read about how to avoid the hidden costs of networking. By Helen Pike. *Page 16.*

HOT ON THE HEELS OF CORPORATE SUCCESS

Through its recent strategic alliances with DEC and IBM, Apple is using connectivity with the large-system vendors as its ticket to corporate MIS environments. Learn how Apple's partnerships and its third-party developers are giving the vendor credibility in the big-business world. By David Kosiur. *Page 29.*

DIPLOMATIC TIES

Setting up a global network that connects a firm's headquarters in the U.S. to an outpost in another country goes beyond choosing the right equipment. Not knowing foreign customs, languages and laws can be as detrimental to a network project as installing incompatible systems. Heed this advice for international systems management. By John Highbarger. *Page 45.*

Forum or against 'em?

By Michael Tucker. The author explores whether Apollo Computer's Network Computing Forum is as selfless in its objective to combine computing and communications as it says it is. *Page 21.*

The sub-LAN subculture

By Stan Kolodziej. If 10M bit/sec. LANs are not your speed, then maybe sub-LANs are for you — small low-cost networks used primarily for peripheral sharing. *Page 27.*

Converging at a data center

By Helen Pike. The private sector is racing ahead of the federal government and its FTS 2000 system modernization plans to unite voice, data and imaging. See how. *Page 39.*

OSI's coming of age

By Harold C. Folts. With OSI celebrating its 10th anniversary, this article analyzes the standard's past and its future. *Page 47.*

Project management tips

By Ronald Kopitowsky. Having trouble keeping projects in line and under budget? Use these telecom project management techniques to help you. *Page 51.*

Go west, young companies

By Ronald Bosco and Larry Stolz. Read about a commissioned study for the state of Wyoming that holds a valuable lesson for MIS managers everywhere. *Page 55.*

SPECIAL SECTION

Corporate clash

IBM and AT&T have made moves that point to a future battle between the two for networking dominance in U.S. corporations. Both vendors have been busy with reorganizations, product development pacts and product debuts designed to raise the stakes in the network arena. Senior Editor Stan Kolodziej scrutinizes this activity and what it means for MIS communications strategies. Page 35.

From the Editor

Including your letters to us. *Page 5.*

News & Analysis

Apple's suit against Microsoft and HP; users involvement in the standards process; the new breed of telecom lawyer. *Page 6.*

Manager's Corner

Jim Young on using backlogs to your advantage. *Page 14.*

Q&A

Software exec stirs up the AI ranks with his philosophy. *Page 15.*

Products

Tech Talk on DEC's AI Vaxstation; HP Openview; Apple's mainframe communications tools. *Page 59.*

Blue Beat

Brian Jeffery on IBM's system integration efforts. *Page 59.*

Calendar

Industry events. *Page 62.*

The Insider

Michael Millikin on distributed network computing. *Page 64.*

Log Off

Pinpointing the group responsible for LAN management in the industrial and service areas. *Page 64.*

COVER BY JAMIE BENNETT

Digital has it now.

"Our goal was to consolidate all city operations to better serve our citizens," states Robert F. Parks, Director of Information Services for Bellevue, Washington. "Because Digital is best at linking everything together, they were our choice for the job."

Digital's networking gives our city's departments–police, fire, water, maintenance, planning, finance, the whole works–a way to share a wealth of data," explains Mr. Parks. One way Bellevue accomplished this was by creating an automated mapping system that's accessed right on the network. "We reproduced every inch of the

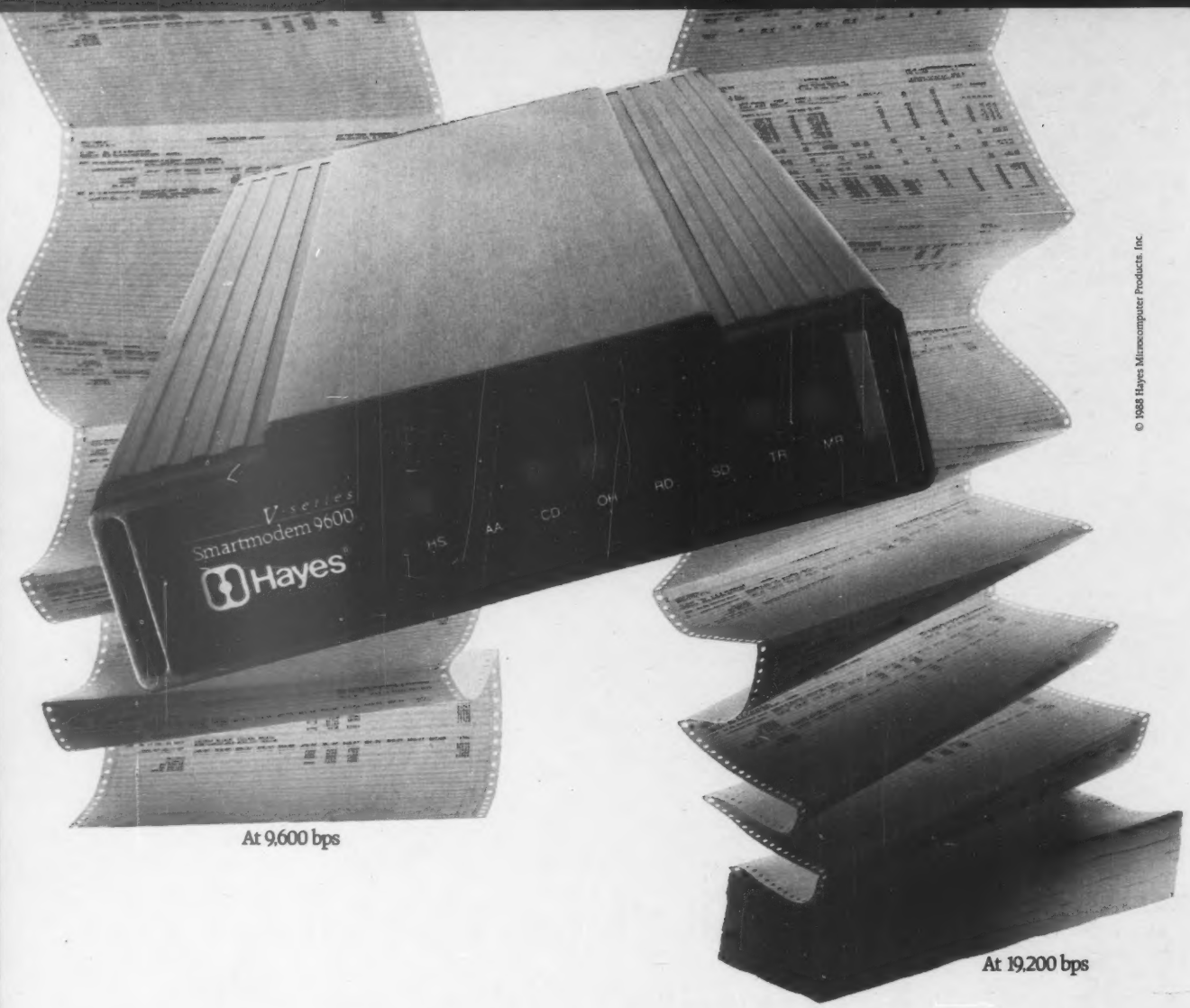
"Digital's networking is improving the quality of service in Bellevue and that's improving our quality of life."

city on electronic maps, allowing us to pinpoint problems instantly," continues Parks. "Whether it's fixing a broken main or dispatching emergency vehicles, we can respond faster and more cost-effectively. Plus, we've dramatically reduced the number of human errors."

Mr. Parks sums up what Digital is helping Bellevue accomplish. "We're using technology to touch the lives of 82,000 people every day." To find out what you can accomplish, write: Digital Equipment Corporation, 200 Baker Ave., West Concord, MA 01742. Or call your local Digital sales office.

digital™

© Digital Equipment Corporation 1987. The Digital logo is a trademark of Digital Equipment Corporation.



© 1988 Hayes Microcomputer Products, Inc.

A MODEM THAT IS TWICE AS GOOD AS IT LOOKS.

It says 9,600 bps. But for this modem, transmitting data at 9,600 bps over dial-up lines isn't the half of it.

Its built-in data compression can boost throughput to 19,200 bps. While error-control prevents loss of data.

With no effort on your part—no selecting protocols, no compressing files.

A V-series Smartmodem 9600™ can even take the place of two modems. Because it communicates in either synchronous or asynchronous mode.

All of which makes our 9600 at least twice as good as it seems.

Or, looking at it the other way, more than double your money's worth.

For your nearest Hayes dealer, call 800-635-1225. Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348. **Hayes.**

Circle Reader Service Number 32

COMPUTERWORLD FOCUS

375 Cochituate Road
Framingham, MA 01701-9171
617-879-0700

Editorial Director/Editor
Ann Dooley
Managing Editor
Lory Zottola
Features Editor
Michael Tucker
Senior Editor
Stan Kolodziej
Senior Writer
Helen Pike
Associate Editor
Julie L. Cook
Editorial Assistant
Catherine Gagnon

Senior Advertising Coordinator
Susan Thaxter
Production Director
Leigh Hometh
Assistant Production Director
Carol Polack
Art Director
Tom Monahan
Production Manager
Christopher P. Cuoco

Computerworld Editor in Chief
Bill Laberis

Second-class postage paid at Framingham, MA, and additional mailing offices.

Computerworld (ISSN 0010-4841) is published weekly, except: (6) issues in February, May, August and October, (5) issues in January, March, April, June, July, September and November and (4) issues in December with a single combined issue for the last week in December and the first week in January of 1989 by CW Publishing/Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171.
Copyright 1988 by CW Publishing/Inc. All rights reserved. *Computerworld* can be purchased on 35 mm microfilm through University Microfilm Int. Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, MI 48106. *Computerworld* is indexed: write to Circulation Dept. for subscription information. Photocopy rights: permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by CW Publishing/Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus $.50 per page is paid directly to Copyright Clearance Center, 21 Congress Street, Salem, MA 01970. Permission to photocopy does not extend to contributed articles followed by this symbol. ‡ Special requests for reprints and permission should be addressed to Nancy M. Shannon, CW Publishing/Inc., 375 Cochituate Road, Framingham, MA 01701-9171.
Subscriptions call toll free (800) 255-6286 or in New Jersey call (800) 322-6286. Subscription rates: $2.00 a copy; U.S. — $44 a year; Canada, Central & So. America — $110 a year; Europe — $165 a year; all other countries — $245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin.

ABC ABP

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld, Circulation Department, P.O. Box 1566, Neptune, NJ 07754-1566.

Write Us

We welcome letters to the editor and publish those we judge to be of interest to our readers. Letters should be addressed to the Editor, *Computerworld Focus*, 375 Cochituate Rd., Box 9171 Framingham, Mass. 01701-9171.

FROM THE EDITOR

An issue of survival

Call this the Darwinian issue of *Focus*. Each time we do an issue on communications and connectivity, the writers vanish. They are overwhelmed by an immense mob of press releases from a thousand different competing vendors, each with a rival communications solution. They yammer, they slice at one another, they propose themselves as the one true answer and they portray their enemies as fit only for extinction.

There's something desperate about it, even terrible. The whole business is like evolution, but speeded up and made even more fearsome than it normally is. Here, competition is so fierce that creatures begin competing early, say, the way that some embryo spiders consume their weaker siblings while still in the egg sac. (And thus it is that today I received a press release saying that a new consortium has formed to produce a communications protocol that will be even faster than the International Standards Organization's Open Systems Interconnect, which is itself only now aborning.)

Below the mounds of press releases is the reason for the "violence." Dig a trench through the incoming mail and you'll find a layer of letters from outraged readers who've tried and tried and tried to get their suppliers to provide connectivity only to be given kludge solutions and vague assurances of a commitment to open systems at some indefinite time in the unspecified future.

Primal forces are at work. MIS managers, that is to say, you the reader, have decided that communications and connectivity are what you want. You've further decided that the supplier who cannot produce them will not be your supplier much longer.

Enter, then, into this issue of *Focus* with a certain caution. There will be *disturbing* things between its pages. You will see shadowy, nameless forms dart away into the darkness, then peer back at you with red glowing eyes. You will hear behind you the sound of the piercing cries of some hunted thing captured and eaten in the night.

Fear not. It is only natural selection at work.

Michael Tucker

FEATURES EDITOR

LAN products available to make a formidable task less daunting

While many computer users are convinced that connectivity can increase productivity dramatically, networking personal computers is a formidable task for most end users. Fortunately, there are many price-competitive local-area networks today that can provide users with considerable value.

Two critical issues need to be addressed for any network system purchase: first, the hardware and software that will perform the required tasks; and second, the cost of maintenance and training because a new set of rules has to be followed.

The cost of a system usually includes not only the original purchase price but also the costs of software and installation. Networking software, compared with single-user software, is in very limited supply in most application areas. It is also difficult to project future needs when planning for purchases. For example, what size network should be purchased? And what are the needs one year or two years from now?

LETTERS TO THE EDITOR

However, the greatest surprise could be the unpredictable costs of training and maintenance. A very sophisticated network security system has both pros and cons. Forgetting a password could be very costly. Proper maintenance could require a costly specialist.

Yet another issue could haunt a lot of users of small networks (three to 15 users). If the network does not perform as desired, it may be impossible to go back to the original PC configuration prior to the network because of the cost involved.

Fortunately, there are several excellent low-cost LANs on the market that can make networking a pleasure. They are easily expandable, can be reversed, require little or no training and are very affordable.

Christopher Leong
President
Trans-M Corp.
Medfield, Mass.

CASE tools: They're not just for programmers anymore

I write to correct the statement of who best uses computer-aided software engineering (CASE) in George Schussel's "Application Development: Tools of the Trade" in the Feb. 3 issue of *Computerworld Focus*.

Mr. Schussel writes, "CASE tools were designed to be used by the professional programmer. . . ."

Our experience with implementing CASE in data processing suggests that *analyst*/programmers use the tool best. Some of our best CASE users have had little or no first-, second- or third-generation programming experience.

Provided that one restricts the definition of CASE to those tools that provide significant automation throughout the "waterfall" systems development life cycle, the skills required of a user are as much or more those of representing the structure of a customer's business policies than those of specifying the procedures by which they are implemented.

Suzanne Niedzielska
CASE Project Manager
The Travelers Cos.
Hartford, Conn.

Continued on page 10

news & analysis

UPDATE

DEC's OLTP strategy unfolds

Like the rising hemlines in the fashion industry, Digital Equipment Corp. is showing more of its on-line transaction processing (OLTP) strategy.

First there was the project code-named Polar Star in March, a four-processor configuration and the first citing of the company's symmetrical processing direction.

Then in April came Project Calypso, a new VAX line numbered 6200. It is a four-box family, graded from one to four processors and covering from 3 to 12 million instructions per second. It comes with VMS 5.0, a VMS version with built-in hooks that will further accommodate transactional processing. VMS 5.0 comes with a new contract under which customers can get a VMS cluster license instead of a per-machine license.

And later this month or in June, DEC is expected to unveil a high-end transaction processing monitor that will act as a front-end for OLTP applications. The company is also expected to announce a package that combines for the first time its forms and terminal management features.

DEC offers WORM-based optical disk storage system

To help handle fast-growing bits of financial information and other data, Digital Equipment in April introduced an optical disk storage system designed in a joint development. The system uses a 2G-byte write-once read-many, or WORM, disk drive. Among Digital's competitors in this area are Wang Laboratories, Inc., with its Wang Integrated Image System, also known as WIIS, that uses digital scanners and optical storage devices.

A funny thing happened on the way to ISDN

On the way to getting greater acceptance for the Integrated Services Digital Network (ISDN), the National Bureau of Standards (NBS) and seven other organizations signed a charter in February forming the North American ISDN Users (NIU) Forum. The group will promote the development and implementation of standard interoperable products for ISDN.

The NIU-Forum will work with established standards and testing organizations and with the NBS Workshop for Implementors of International Standards Organization (ISO) Open Systems Interconnect (OSI) to develop implementation agreements.

The other founding organizations are Ameritech, the Association of Data Communications Users (ADCU), Bell Atlantic Corp. (BAC), Bell Communications Research Corp. (Bellcore), International Computers Ltd. (ICL), New York-New England Corp. (Nynex) and Southwestern Bell Telephone (SWBT).

How's that for alphabet soup?

Memory chip shortage expected to ease by summer

Wondering how much longer before the wait is over for those new micros and workstations you ordered?

The Computer and Business Equipment Manufacturers Association (CBEMA) in Washington, D.C., is hopeful that by early summer memory chips will once again be plentiful and computer makers will be able to ramp up their production lines to fill orders, according to Charlotte LeGates, CBEMA's communications director.

"It's a slowdown, though not a stoppage, of manufacturing various product lines," LeGates observed in March. Hardest hit during the last two quarters were makers of self-contained workstations, like those from Sun Microsystems, Inc., and memory-heavy personal computers, like the Macintosh II from Apple Computer, Inc., she said. Right now, "delays between purchase and installation are manageable but not ideal."

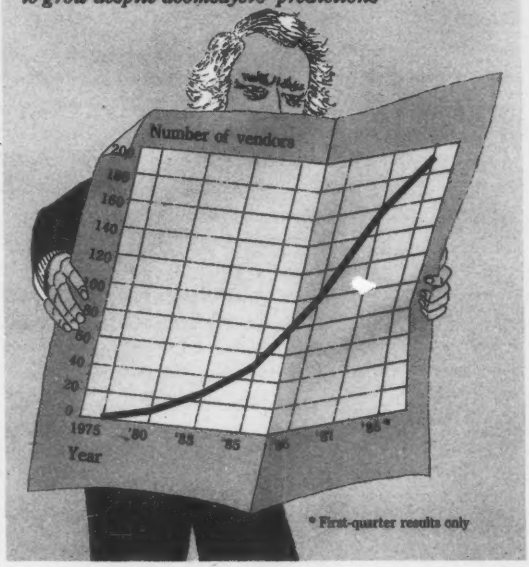
PC and workstation manufacturers also have noticed a trend by their customers to overorder as compensation for fewer computers, she said. "The market's a little confused."

Some of the blame for the memory chip shortage is laid on a

Continued on page 13

'The reports of my death are greatly exaggerated'

The number of U.S. TCP/IP vendors continues to grow despite doomsayers' predictions



INFORMATION PROVIDED BY INFONETICS, INC.

GRAPHIC BY BRUCE SANDERS

Apple suit may be a covert strike at rivals

On March 17, Apple Computer, Inc. served up a very unwelcome St. Patrick's Day gift to Microsoft Corp. and Hewlett-Packard Co. In a suit claiming unfair business practices, Apple said that Microsoft's Windows 2.03 and HP's New Wave interface, which is based on Windows, improperly reproduce the look and feel of the Apple Macintosh interface.

The suit may be important in the history of commercial software on several levels, including that of connectivity.

At its simplest, the suit continues the ongoing legal controversy regarding the look-and-feel issue. Increasingly, the courts are being asked to decide whether the appearance of a program can be copyrighted. Apple's suit describes the Mac interface as a literary work, subject to the same copyright protection afforded a novel or a play.

The defendants in the case have not exactly rejected that argument — they, too, have software products that may someday have to be protected on the same grounds. However, they have disputed the idea that the Macintosh's interface is unique enough to be defended as such.

They say that the use of icons, words, pictures and the like is public domain, either because they are naturally part of the

Continued on page 10

User input in the standards-making process is not what it should be. Page 10.

Now Macs and PCs can have all the power of the Sun.

TOPS® The company that taught Macs and PCs to talk to each other, is now teaching them to talk to the rest of the world, including the Sun Workstation.®

Make the connection with TOPS/Sun.

Now a Mac or PC on a TOPS Network can be integrated with virtually any computing environment. All it takes is one copy of TOPS for Sun Workstations, plus the appropriate Ethernet connection. The Sun Workstation becomes a server for any Mac or PC on a TOPS Network, and provides immediate access to all published resources and files, including NFS-mounted volumes.

The result is that micro users can tap into Sun's vast storage capacity with total security, for both on-line work and for use as a centralized storage area for quick and easy file back-up. All without learning a word of UNIX.® TOPS does all the translating, so Mac & PC users can keep their familiar interfaces. Which means that TOPS/Sun couldn't be easier to learn and use.

Access multiple systems simultaneously on a Mac.

TOPS also offers TOPS Terminal.® It's the first commercially available terminal emulation product that allows a Macintosh® to interact with any number of TCP/IP systems.

Which opens up some exciting possibilities for users. They can simultaneously access the massive processing power of a Sun and other TCP/IP hosts. And can cut and paste between windows, transfer files and even file into E-mail systems. Text editing is transparent, because TOPS Terminal reads and writes UNIX, PC and Mac text files.

For more information on TOPS/Sun and TOPS Terminal, call **800-222-TOPS**, (in California call 800-445-TOPS). Be sure to ask about our university and volume discounts.

TOPS/Sun and TOPS Terminal. For people who want to connect to everything under the Sun. Not to mention almost everything else.

TOPS®

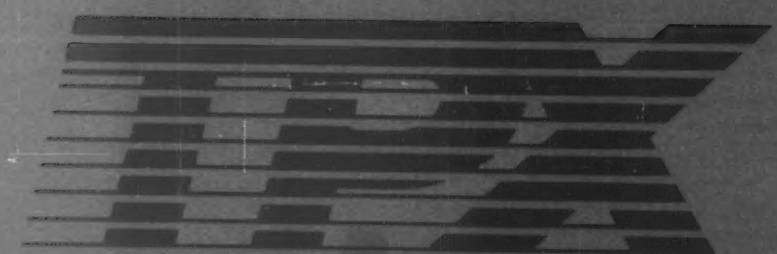
A Sun Microsystems Company
950 Marina Village Parkway
Alameda, California 94501
415/549-8700

TOPS for Sun Workstations and TOPS Terminal require a Kinetics Fastlink® or a direct Ethernet connection, both of which are available from TOPS.

TOPS and Sun Workstation are registered trademarks of Sun Microsystems, Inc. TOPS® is a registered trademark of Sun Microsystems, Inc. UNIX is a registered trademark of AT&T. Macintosh is a trademark of Apple Computer Inc. FastPath is a trademark of Kinetics, Inc. All other trademarks are the property of their respective companies.

Circle Reader Service Number 2

The reasons may vary, but the choice is the same.



TPX–The choice for session management.

As the number of online users increases, networks and access to them become increasingly complex. Network users must be able to access information quickly and easily, but selecting the best approach for serving these users can be difficult. The following companies recognized the best choice for session management is TPX (Terminal Productivity Executive) from Duquesne Systems.

TPX is a group of integrated services that improve productivity for users of online systems. It is a full-function, VTAM-based session manager for MVS and VM environments. TPX offers network-level services which include session portability and security system interfaces. It also supports concurrent connection to several online applications and enables users to switch among them using a single command or PF key. Session automation and network-wide messaging capabilities are also available as optional services, and a data compression option reduces network activity, providing significant savings.

"I've been involved in evaluations of TPX at three different sites and have evaluated other session managers as well. TPX is the top-of-the-line in session managers in my mind. We were especially pleased with the security system interfaces that allow us to maintain security from a single point of entry."

Tom Learned
Senior Data Communications Specialist
Fleet Information Inc.

"We're impressed with the quality of technical support Duquesne Systems offers. There's always someone available to answer questions, solve problems, or discuss ideas. When we call, we usually get instant response to our needs. We wouldn't have gotten as far with session management without TPX and top-grade support."

Terry Sprigg
Engineering Mgr., Information Systems
Royal Trust

"We have more than 2,000 users defined to TPX—1,000 of which may be active at peak times. This translates into about 2,500 active sessions on our 3090-400 with TPX responsible for only 2% of the CPU resource consumption. We consider this a small price to pay considering the increase in user productivity."

Randy Chapman
Network Systems Programmer
UNUM Life

DUQUESNE SYSTEMS

(800) 323-2600
(412) 323-2600 In PA

Circle Reader Service Number 3

Users cry for standards but don't get involved

For years, users have been screaming at vendors and standards groups to sit down, unravel the mess that a decade of incompatible, proprietary networking products has wrought and agree on standards that will help get multivendor computer networking into full gear.

Plenty of standards committees and work groups have been formed, well-represented by network vendors but sparsely attended by users. It seems that the people who have been pressing the most for standards do not sit down and help iron out differences that will directly affect their own networking.

Take the recent deliberations of the IEEE 802.3 work group on 10M bit/sec. Ethernet over twisted-pair wire, also known as the 10BaseT group. 10BaseT, which has just passed one of its standards proposals through the scrutiny of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) and received the go-ahead to form a task force to push through an agreeable standard as soon as possible, has almost 30 companies represented in its membership.

Of that group, there are no members present that could be classified as true users. All are companies with "vested product interests," says Fred Sammartino, headquarters marketing manager at David Systems, Inc., a Sunnyvale, Calif., network vendor and member of 10BaseT.

"We were disappointed that there weren't more users on board," Sammartino says. "It would have given more balance to the proceedings."

And it is not that users cannot attend such standards meetings.

"We [the IEEE] don't have any organizational policies that bar individual users from attending and participating in these standards meetings," explains Don Loughry, the standards manager for the Information Networks Group at Hewlett-Packard Co. and the chairman of 802.3 proceedings at IEEE. "There are just not enough users who want to attend."

Too many out there

Part of the problem may be that there are too many standards groups working in too many areas, according to Pat Thaler, a development engineer for local-area network standards at HP and chairwoman of the 10BaseT task force.

"Users seem to become more involved in National Bureau of Standards-type forums, where the issues are broader based. What we're dealing with here [10BaseT] is one of the sublayers of the seven-layer [International Standards Organization (ISO) Open Systems Interconnect] networking model. Another problem is that such committee work is probably not advertised enough," she says.

A result of most committees being vendor-heavy, Loughry says, is that many standards groups wind up dwelling on small connectivity concerns instead of the big picture.

"The big issues are not part of it," Loughry says. "These types of groups would have to be able to take many such details and broaden them into how they will affect their networking overall in the future. That's very difficult."

Even so, the lack of such participation by users is considered regrettable by Loughry and Sammartino.

"The 10BaseT work is at the bottom of ISO layer considerations, but it is very important because it will pave the way for users to handle high-volume high-speed Ethernet networking using their on-site unshielded twisted-pair wiring," Sammartino explains. "It will make networking more flexible and cut costs. That's a big impact."

The absence of user input also lets important standards deliberations fall victim to the political maneuverings of contending vendors, whose jockeying for strength using products designed on their own standards proposals can delay the entire process, in turn delaying the benefits such standards would bring to end users.

For example, despite suspicions from some 10BaseT members that Digital Equipment Corp. intentionally delayed the presentation of its 10BaseT proposal (which was ultimately rejected), Thaler says that 10BaseT work goes through much faster and without the kinds of stall tactics that can plague other groups.

"I've seen attendees [at other groups] wait until the last minute to make suggestions, knowing it would be too late to counter," Thaler explains. "I've seen members introduce bogus items into objection lists, and I've heard people delay by talking about politics or about anything but the business at hand. There are a million ways to slow things down."

A case in point is the current IEEE work on creating a fiber optics/Ethernet standard. Several vendors are so deadlocked on this standards issue that it has delayed any meaningful work for more than two years, insiders say. And apparently, there is no letup in sight. — SK

Apple suit

Continued from page 6

way people relate to computers or because all computer vendors have been using similar approaches to graphically based interfaces for so long that no one can claim ownership of the idea.

Indeed, one of the more curious aspects of Apple's suit is that the concepts being defended have been around awhile. The official complaint lists 13 "audiovisual works" that the defendants may have infringed upon. Of these, six are described as being derived from the ill-fated Apple Lisa computer, the machine that predated the Mac in the early 1980s and on which most of the original Mac interface was developed.

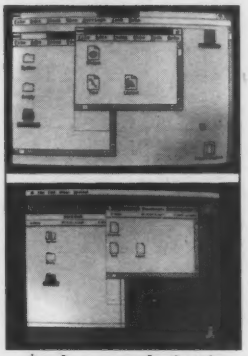
Moreover, Apple's own interface products can be traced directly back to older technologies such as those developed by Xerox Corp. during the late 1970s.

Deeper into the problem, though, is the suit's relationship to the rivalry between Apple and its competitors. After it was announced, the suit was widely interpreted as being basically unrelated to the look-and-feel controversy. Rather, it was seen as a covert strike at IBM, which has long been known to include Microsoft's Windows as a key part of its plans for personal computing. In fact, it has been said that Windows is part of IBM's larger goal to link its Personal Computers and Personal System/2s to larger IBM systems. If Apple could somehow make it difficult to use Windows as the desktop extension of IBM's Systems Application Architecture, then IBM might have to rethink part of its connectivity strategy.

Other observers have, however, suggested that the real target may be Microsoft. One Apple software developer, who asked not to be named, claimed, "I'm not worried about [the suit] affecting me. I think this is between Apple and Microsoft. You have to remember, there's been bad blood between those two for years. It used to be that they [Microsoft] could jerk Apple around, because they were the only people who wrote stuff for the Mac. Now that's not true. And Apple's looking to settle up."

Whatever the underlying motivation for the suit, it fits in with a larger pattern of Apple's history. The company has a cyclical history of swinging in and out of proprietary architectures and software.

For instance, in its early days, Apple was a very open company. Its Apple IIe was an almost completely open box, just as the IBM Personal Computer was to be later on. And just as the PC would be, the IIe became widely



Apple contends *that the displays in HP's New Wave program (top) are substantially similar to Apple's copyrighted Mac displays (bottom).*

copied. Apple learned what IBM was to discover later — that it is not easy to make a profit with completely open systems.

Then, beginning with the Lisa and finishing with the first Macintoshes in the middle 1980s, Apple swung into a completely closed architecture and watched the world adopt Microsoft MS-DOS machines as a standard.

Now, perhaps, Apple is taking a middle course. Last year, Apple introduced a new generation of Macintoshes that are fairly open in terms of hardware and applications software. But with this suit, Apple may be serving notice that there are still areas in the systems' software that the company plans to keep for its own. — MT

Buy a HYDRA® from C&B Software and get a free modem.

If you have a 4300 or 30XX series mainframe, you should seriously consider the HYDRA protocol converter. Here are just a few reasons:

- Channel Attaches to Mainframe
- 3211 System Printer Emulation
- Password & Callback Security
- Light Pen Support

We offer professional installation as well as a line of compatible peripherals. And now for a limited time, if you buy any size HYDRA from us, we'll toss in a 2400 bps modem absolutely free.

CALL 800-248-3270
In California call 714-676-5323

C & B Software

28561 Front St. • Suite 100 • Temecula, CA 92390

We Sell Solutions That Work

HYDRA is a registered trademark of JDS Microprocessing, Inc.

Circle Reader Service Number 4

Letters

Continued from page 5

A dark horse in PC operating system race

Michael Tucker displays a great deal of insight when he writes in the February issue: "Unix isn't alone. There are a lot of other multiuser, multitasking operating systems out there." However, the field of competitors that "now have a shot at riding micros into MIS" is wider than he appears to be aware.

In particular, the QNX operating system from Quantum Software Systems Ltd., with more than 35,000 installations worldwide, cannot be overlooked as a strong contender.

QNX is a multiuser, multitasking system, providing 150 concurrent tasks in protected mode and 64 concurrent tasks in real mode. It also supports up to 32 serial ports and files up to one terabyte in size.

QNX may be the dark horse in the current race to set an operating system standard for personal computers.

Jan Scheeren
Quantum Software Systems, Ltd.
Kanata, Ont., Canada

You *can* judge a book by its cover

I am a dedicated reader of *Computerworld Focus*. I find your magazine to be a valuable source of information. Upon receiving the Feb. 3 issue, I found the front cover to be very original. My compliments to all at *Focus*.

Jose E. Muniz
One Pace Plaza
New York

The longer you wait, the deeper it gets.

When your computer's down, every minute counts. And costs.

That's why Sorbus,℠ the world's leading independent computer service company, maintains an average response time of just *two hours*.

And an average repair time of only *one and one-half hours*.

In other words, about three and one-half hours from crashed to crunching.

We cover more than 3,000 different hardware products–mainframes, minis, micros, peripherals. Including more IBM® equipment than anyone but IBM.

Altogether, we maintain more than 400,000 pieces of computer hardware (including DEC™ equipment) at 60,000 sites nationwide. Chances are, we should be maintaining yours, too.

So call Sorbus today. While there's still time.

1-800-FOR-INFO.

Sorbus℠

A **Bell Atlantic**™ Company

50 E. Swedesford Road
Frazer, PA 19355

Sorbus is a service mark of Sorbus Inc.

IBM is a registered trademark of International Business Machines Corporation.

DEC is a trademark of Digital Equipment Corporation.

Circle Reader Service Number 5

The long arm of the law

New breed of lawyer specializes in telecom

Slowly but surely and for better or worse, the rule of law is coming to the telecom and datacom worlds.

Today, the most powerful jurist in the U.S. may be District Judge Harold Greene, the federal judge whose role in interpreting the Modified Final Judgment concerning the activities of the regional Bell holding companies makes him a regulatory commission in his own right. He has the power to tell the holding companies what they can and cannot do. In his most recent decision on March 7, Greene allowed the holding companies to market voice mail and gateways to information services.

He barred them, however, from directly offering information services themselves. They cannot, for instance, acquire on-line data bases and sell them. They also cannot offer on-line Yellow Pages-type directories.

Greene's power over the regional Bell holding companies has become the subject of considerable debate in the industry. Analysts and industry insiders ask whether it is fair or just to turn over such power to an individual who is not a technologist. (See "Greene in Judgment," *Computerworld Focus*, Jan. 6.)

Defenders of the current system, however, say there are few alternatives. The whole communications industry is so new that more traditional legal mechanisms are not well equipped to deal with it. Few lawyers are familiar with the issues within telecom and datacom, and few precedents exist to assist judges in making decisions.

The situation is, however, beginning to change. A few pioneering schools have established programs expressly for lawyers in the communications field. California Western School of Law in San Diego is one of the first. Its communications program was established nearly two years ago as a result of a grant from the Al Simon Foundation. (The late Al Simon was deeply involved in the communications industry. He frequently found that, although he was not a lawyer, he had to argue his own cases in court because no lawyers had the training to do it for him.)

Similar programs exist at Wayne State University in Detroit and Georgetown University in Washington, D.C., among others.

From exotic to standard

While it may be some time before graduates of these programs will be in a position to significantly impact the course of telecom regulation in the U.S., at least the existence of a trained body of specialists in the field means that communications law will eventually be more standardized. Exotic situations in which a single jurist is asked to chart as-yet-unexplored legal territory will be less common.

Indeed, Greene himself participated in this process in March when he acted as a judge at the first-ever National Telecommunications Moot Court, sponsored by California Western and won by a Wayne State team. A moot court is a competition in which teams of law students are presented with a hypothetical case and are asked to argue it before a panel of real judges. The winning team is the one with the most convincing argument.

Moot courts are a common fixture of law schools, but there have been none specifically targeted at the communications industry until California Western's competition. In it, the moot court presented students with a situation in which a regional telephone company wished to introduce certain technological innovations that would improve service for its customers but that also violated restrictions on the company's ability to compete in certain markets. — MT

Business Software
That Reflects the Way You Work

Your day is spent juggling one thing after another. Writing reports...updating budgets...a call to review the new financials...scheduling meetings...a memo to the field...creating a business presentation...checking your customer list and much more. If you're juggling, why is your standalone software handling only one task at a time?

Uniplex puts the key business tools at your fingertips in a comprehensive business software system.

Integrated...business functions including word processing, spreadsheet, database management, electronic mail, personal desk accessories and an advanced graphics system in one easy-to-use software system with a single set of commands.

Flexible...with the option to customize screens and menus, tailoring them for the organization, a departmental group or an individual.

Multi-User...environments like Unix, Xenix and Ultrix are where Uniplex Business Software runs with an efficient networking capability.

Portable...Uniplex Business Software runs on more than sixty different hardware systems – mainframe, mini and micro.

Proven...In successful government, military, business and education installations worldwide.

Finally, business software that truly reflects the way you work.

Contact your dealer or call (800) 356-8063

UNIPLEX BUSINESS SOFTWARE

Glen Lakes Tower, 9400 N. Central Expressway
Dallas, Texas 75231

Circle Reader Service Number 8

June event to showcase OSI-based solutions

Don't jump to the next story. Don't turn the page. The companies involved in pushing the Manufacturing Automation Protocol (MAP) and the Technical and Office Protocol (TOP) insist that next month, you will finally see the first standardized products that open up the way for communications compatibility within the International Standards Organization's (ISO) Open Systems Interconnect (OSI). The debut for these products is set for the Enterprise Networking Event '88 International conference June 5 to 9 at the Baltimore Convention Center.

But if you are in MIS, why should you care?

Because of the cost-effectiveness that can be gained from integrating voice and data, according to Anthony Materna, director of data integration systems in the Technical Services Operations of TRW, Inc.'s Information Systems Group in Long Beach, Calif. Traditionally, users have been sensitive to costs, Materna observes, while MIS has served as an overhead organization that distributes costs.

But the argument that relates integrated data and voice communications to better cost management is one that is gaining momentum, particularly in industrial companies. Fortuitously, this trend coincides with the OSI standard looming on the horizon.

Final approval for MAP 3.0 is expected in July from the ISO. Among Release 3.0's features are support for network management and directory services, file transfer and access management capabilities, manufacturing messaging services and an enhanced-performance architecture.

As Materna sees it, the MAP/TOP push will make communications interfaces a standard installation in much the same way that modems are for workstations. So far, the drive for MAP Release 3.0 has produced test tools and a few applications that meet the OSI criteria. To see is to believe, and users can see for themselves in Baltimore.

The conference is sponsored by the Corporation for Open Systems and the U.S. MAP/TOP Users Group and is produced and managed by the Society of Manufacturing Engineers. — HP

Update

Continued from page 6

1986 U.S.-Japan trade pact aimed at getting Japanese chip makers to stop dumping their excess semiconductors on the American market at below-market prices.

Now, according to U.S computer manufacturers, there aren't enough chips to go around. The Semiconductor Industry Association, however, contends the shortage is caused by a rising demand for chips and a changeover to a new generation of technology.

According to CBEMA's LeGates, if the shortage of memory chips continues, then "customers could switch to other vendors, to a foreign company instead of an American one. [However], we are opposed to a move to further sanction the Japanese."

In a related move, IBM confirmed last month it has supplied some of its competitors with state-of-the-art computer chips during the last two years. Big Blue maintains it did so to test its own semiconductor designs against those of its Japanese counterparts.

Digital Equipment Corp., Unisys Corp. and NCR Corp. are among the organizations that IBM approached. Clyde Prestowitz, the former chief trade negotiator for the U.S. Department of Commerce, wrote that IBM had offered to supply semiconductors to Digital in order to prevent the U.S. "from falling even further into Japanese hands."

Prestowitz penned his point of view in his recently released book, *Trading Place: How We Allowed Japan to Take the Lead.*

IBM disputes Prestowitz's comments regarding the company's motives.

Token-ring shipments to catch Ethernet by 1990

More American-made token rings are finding their way into the world. Estimates from International Data Corp. (IDC) in Framingham, Mass., project that worldwide token-ring shipments from U.S. vendors should even up the score with Ethernet shipments by 1990 with a 45%-45% split. (The remaining 10% falls under the category of "other.")

This year, IDC expects worldwide shipments to be 15% for token rings and 75% for Ethernet; but by 1993, those percentages are expected to flip-flop.

It will take a little while for token-ring shipments to impact the installed base of networks though, according to Doug Gold, a senior analyst for local-area networks at IDC. Of the 1.5 million networks in existence, 90% of them are Ethernet, 8% of them are Arcnet and 2% are token ring, he says.

IBM, which introduced its Token-Ring in 1986, has an installed base of 12,000 Token-Ring networks so far, according to Gold. As the company starts to sell more of its Token-Ring networks, the overall market for the technology will increase, he adds.

AT&T, IBM appear to be switching computer roles

IBM plunked down spare change to buy the Pactel Spectrum Services unit of Pacific Telesis Group in San Francisco. Pactel Spectrum provides equipment and diagnostic services used to manage the voice and data transmissions of non-IBM Systems Network Architecture devices.

IBM says it plans to integrate Pactel Spectrum's diagnostic capabilites into its Netview software.

The acquisition represents the second telecommunications-related purchase made by Big Blue in its bid to remain competitive against AT&T, which, conversely, has been moving into the computer business in a big way. In 1984, IBM bought Rolm Corp.

AT&T, meanwhile, opened its wallet to buy Tridom Corp., a maker of satellite-based data communications equipment located in Marietta, Ga. The purchase of Tridom by AT&T requires the approval of the Federal Communications Commission.

DEC readies integrated voice/data wares for the fall

Digital Equipment Corp. is readying its first computer-integrated telephony (CIT) products for later this fall, likely to be unveiled at Decworld '88 in early September.

CIT technology promises to provide common interfaces for the exchange of information between computer hosts and telecommunications equipment, particularly private branch exchanges.

"We're looking at voice and computer integration as a solution, not as another technology," explains Jim Cox, CIT marketing manager of DEC's Network Communications Group in Merrimack, N.H. Digital's solution is essentially a link between, for example, a DEC VAX terminal using the company's menu-driven All-In-1 office software package and a digital switch.

According to Cox, the integration will take place in the seventh level of the International Standards Organization's Open Systems Interconnect (OSI) standard.

Layer 7 of OSI is known as the applications layer and it contains functions for such services such as file transfer, remote file access and virtual terminals.

The CIT program represents a four-year effort in which Digital involved British Telecommunications PLC and Northern Telecom, Inc., among others, in its strategy to come up with a total network management facility that uses voice and data switches to local-area networks.

Products are expected to be compatible with local- and wide-area networks and eventually should accommodate the Integrated Services Digital Network (ISDN). Cox, who has been involved in the telecommunications industry since 1965, sees ISDN opening the way for video applications sometime in the mid-1990s.

The integration of voice, data and video "is strongly linked to the global availability of ISDN," he adds.

Worldwide summit of stock execs under consideration

A possible worldwide summit of stock exchange executives, including MIS and telecommunications managers, is under consideration by U.S. Rep. Edward Markey (D-Mass.), the congressman who chairs the increasingly important House Subcommittee on Telecommunications and Finance.

Markey had already chaired hearings on the globalization of the securities market before the October stock market plunge.

Markey continues to take testimony on general issues involving stock market reform and telecommunications technology and is expected to launch a hearing devoted just to global issues. — HP

News section compiled and written by *Computerworld Focus* staff members Stan Kniodziej, Helen Pike and Michael Tucker.

MANAGER'S CORNER

Backlogs brought to the forefront

Jim Young

One of the nice things about new technology is that, occasionally, it can eliminate outdated ideas and break the logjam of outmoded tradition. For instance, fourth-generation languages finally obviated the need for program flow charts long after many felt this practice had outlived its usefulness. In a similar nudge, personal computers, departmental computing and other alternate computing methods have happily eclipsed the long-standing MIS obsession with the applications backlog.

For years, the amount of pending MIS development work (always expressed as the number of years of continual work it would take by the existing staff to finish all approved projects) was meticulously calculated and brandished about by the MIS cognoscenti with a mixture of egocentric awe and self-indulgent martyrdom. Figures were compared from shop to shop in a "Can you top this?" spirit. Learned arguments raged about what was the "optimum" backlog level and what was the most meaningful way to calculate this significant statistic.

As a self-confessed backlog fanatic, I can tell you now that there is little about the figure that is significant. The fact that there are two or three years of work outstanding indicates nothing about the worthiness of the awaiting tasks. At best, the calculation may reveal a natural and even healthy phenomenon endemic to growing support organizations. In any event, publicizing the imposing amount of work rarely achieves the undisguised purpose of inducing management to authorize more resources. Sadly, many DP shops spend more time estimating the required effort for projects that they will never get to than devoting this time to completing some of these requests.

The concept of the backlog has had derogatory effects. First, it pointed out that MIS was the only game in town for technical services; the backlog was a visible reminder of everything MIS could *not* do.

Secondly, functioning on the premise that all "valid" work should be approved (this made the numbers even more impressive), the concept encouraged authorization of requests that immediately went to the bottom of the priority list. It was easy to OK all requests, because official MIS approval was not a commitment to the task's completion. Even for important requests, some subsequent demand always seemed to divert MIS's attention. As a result of this triage strategy, valid but neglected work languished.

Ultimately, what did happen was the introduction of technologies that allowed fresh, creative approaches to many disenfranchised problems. In some cases, these developments meant that users stopped waiting for MIS to get to their problems and solved them themselves. No longer would much of their work be held hostage in an MIS queue. In progressive environments, MIS saw that using these technologies was a quicker way to address ancient ills. This fresh approach not only made the old common denominator of "years of work" meaningless by using efficiency techniques, but it also introduced productivity tools to users.

These tools made many of the old requests for canned reports and analyses meaningless. Because not all work was going to MIS, because there was little advantage in calling attention to how much was not getting done and because the standard unit measure of work was being devalued, the MIS backlog ceased to be a meaningful management barometer.

While the demise of this pretentious calculation frees MIS to focus on more realistic and encouraging measures, not all of the trappings of the backlog should be discarded as valueless. Some of the supporting activity is like the baby that must not be thrown out with the bath water. Indeed, the instinct to identify all potential work serves several useful purposes:

• **Productivity.** If analysts are given some insight into potential upcoming work, the designs they create have a better chance of not becoming obsolete immediately. Interrelated changes can be verified against one another. More importantly, similar or neighboring changes can be bundled together to permit the maximum number of improvements to be completed with the least amount of effort.

• **Planning.** With some understanding of the work that lies ahead, tasks can be scheduled in the ideal sequence. This ordering allows for the obvious technical priorities, such as performing upcoming data base changes before creating dependent report programs, and lets MIS anticipate evolving skill requirements, which may result in more beneficial staff schedules. If this anticipation is early enough and certain enough, MIS can even infer training and hiring plans.

• **Prioritization.** Unless an organization knows what work could be done, how can it wisely choose the best possible project for completion? Companies quickly discover that it is impossible to do all worthy projects, so they wisely attempt to do as many as limited resources will allow, in order of importance. Project precedence is usually determined by return on investment, expected return or some other quantifiable measure. With the work identified and objective evaluation tools in place, firms can ensure that they get maximum benefits from finite MIS resources.

• **Strategic direction.** It is often valuable for MIS to survey the needs of an organization so it can implement suitable programs. Rather than attacking many projects one at a time or even in optimally grouped sequences, the body of needs may suggest a fundamentally different direction. An overwhelming need for new reports might imply the need for end-user report generation tools, not more Cobol programs. A preponderance of problems in one area could hint at the need for either more training, a new system or even a dedicated, distributed solution. It is necessary to see the big picture if MIS is expected to contribute to the big picture.

While the absolute backlog measurements may have little direct usefulness, the process of computing that figure can reveal meaningful information. Of course, this requires not only objective and consistent measurements but a healthy comprehension of what is being analyzed. This information can show the following:

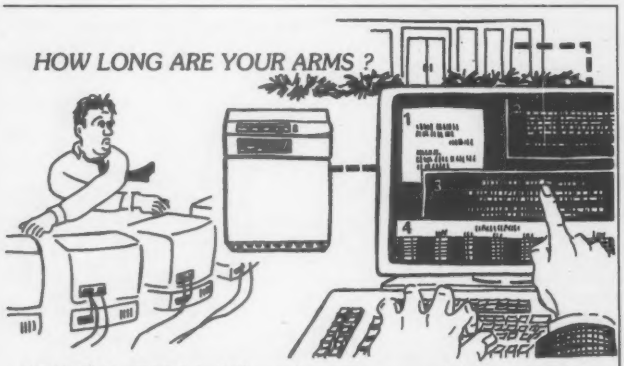
• **Changes in backlog.** Like business revenue, the backlog number by itself is enigmatic, but, over time, its changes can reveal significant events and suggest management action. A growing backlog might point to either lower MIS productivity or accelerating user needs. When the backlog is compartmentalized by function or by system, the same trends can be deduced for user groups, such as marketing, or for application systems, such as general ledger. This examination can assist in tracking major system life cycles and new system effectiveness.

• **Quality of the backlog.** MIS should evaluate the importance of the work awaiting attention to determine if useless tasks are inadvertently placed in a queue or if essential work is being ignored. If so, the gating and prioritization mechanisms may be in need of a tune-up. Furthermore, a periodic assessment of the changing nature of the backlog might give insights similar to those reached by observing changes in volume.

• **Staffing implications.** By evaluating the value of projects under way vs. those awaiting attention, adjustments to staffing levels can be quantified and justified. Though understaffed situations are often obvious to MIS, it has traditionally been very difficult to justify this need to top management because no single project of the numerous changing requests in the backlog can justify increasing staffing levels. Tracking the outstanding work properly permits the resource adjustment.

In fairness, the pejorative reputation of the applications development backlog is caused by how it is used. The backlog, when deployed only as a tool to gain sympathy for how much work MIS has or to focus on all that is not getting done, has no place in modern MIS management methods. If, on the other hand, similar processes are creatively applied to increasing productivity, department performance and the quality of support, then the practice of managing requested work will be a welcome addition to MIS's arsenal. It is the actions of the MIS manager that determine whether backlog management is an asset or a disadvantage.

Young is managing director of MIS for the Wheeler Group, a division of Pitney Bowes, Inc. in Hartford, Conn.



AT&T's* 6500 Multifunction Communication System

Available through FICOMP, Inc. system distributors of voice and data communication products.

Unify company-wide communications with the system that lets you view and interact with four processors simultaneously. The 6500 system supports concurrent BISYNC, SNA/SDLC, X.25, and ASYNC sessions.

Access information stored in multiple locations. The multi-host capability puts you on-line with computers both inside and outside your company.

The 6500 system was created with AT&T's experience and knowledge of three previous generations of 3270 systems.

Its advanced capabilities enable the user to provide both local and remote support. And, it is easily upgraded to adapt to your future needs as your business grows and changes.

FICOMP offers you:
- Total support and immediate delivery of the 6500 Multifunction System.
- Flexible purchase and lease terms across the entire product line.
- Experience - to date we have supplied more than 10,000 3270 compatible terminals.

THINK FICOMP WHEN YOU REQUIRE AT&T PRODUCTS.

Contact our nearest office:
3015 Advance Lane
Colmar, PA 18915
(215) 997-2600
(215) 997-2609 FAX

1090 King George Post Road
Suite 405
Edison, NJ 08837
(201) 738-3737
(201) 738-3925 FAX

*AT&T is a trademark of AT & T Information Systems

FICOMP, INC.

Circle Reader Service Number 7

Q AND A

Fernando Flores

Software executive stirs up the AI ranks with his controversial philosophy

Fernando Flores is chairman of Action Technologies, Inc., an Emeryville, Calif., software company. He is also the co-author, with Terry Winograd, associate professor of Computer Science at Stanford (Calif.) University, of *Understanding Computers and Cognition*. The book has become something of a cause celebre within the ranks of the artificial intelligence community for its gloves-off approach to many of the supposedly untouchable underpinnings of AI thought. In fact, "Artificial Intelligence," considered the industry's most prestigious journal on the subject, recently dedicated four reviews to the book in a single issue. The reviews ranged from condemnatory to laudatory, perhaps accurately reflecting the same sort of polarization that Flores's book and theories have engendered in the AI community.

Flores, however, is not new to controversy. Chile's Minister of Finance in the ill-fated regime of Salvadore Allende, Flores spent almost three years in a Chilean prison until pressure exerted by the U.S. State Department and Amnesty International helped secure his release. Flores then made his way to the U.S. and the University of California at Berkeley, where he earned a Ph.D. in philosophy and developed the theories on cognition and communication that he is now channeling into the computer marketplace.

Flores spoke with *Computerworld Focus*'s Senior Editor Stan Kolodziej about the state of AI, about communications and about The Coordinator, Action Technologies' communications product based on Flores's theories.

What is the problem with artificial intelligence?

Artificial intelligence [as a study] is so concerned with trying to duplicate humans with machines that [researchers in the field] don't realize the more interesting phenomenon of computers in networking. AI's approach is to focus solely on the transportation of data, but we, as designers, want to design machines that will initiate action in networks. All networks are really a way of communicating and coordinating action, not just moving data. The real problem is in designing machines in networks of human beings that amplify the possibilities of human beings.

The press talks too much about information and messages, but they don't talk about what people really do. They fail to see the obvious.

Could you elaborate?

Language is not all symbols and signs as AI would like us to think. Language is not principally a phenomenon described in realities, because language itself constitutes reality, and language is life itself. Within language and, therefore, within communication, there are certain conditions that hold true regardless of whether communication is conducted in Spanish, French or whatever language. These conditions are generic, if you like.

All communication is action, in the sense that any communication, written, oral, whatever, will result in some request for a reply and a promise to do so. It doesn't matter what the language is. If you take the time to look at all communication, you will see this is true.

The trick is in designing machines that will better coordinate such action in communication, especially now in offices, and that will really have the result of letting people be better at what they do. A network machine designed on these principles will be a breakthrough because it will not be forced on people, will not force people to change. It will be an extension of the way people already work.

But artificial intelligence is mostly a failure in this regard, because it is based on bad theory — that people are basically information processing systems and that both machines and people simply process data.

From there comes the assumption that the more data there is, the better. The data itself is not important; it's the things that make a difference with that data that are important.

How does The Coordinator make a difference?

It keeps track of people's communication and makes sure that actions and responses are being coordinated within appropriate times. It is not just electronic mail, it is not just voice messaging. It is in the software, and it is based on the theory of communication we have explained in our book.

You get a much different result than just sending information back and forth. It is an important first step that will change the way we work.

How do you see your theories and The Coordinator fitting into data and voice communications in the next few years?

Our theories will have a major impact in years to come, and I think The Coordinator will represent a generic technology in this area. It will take advantage of some good, related technology such as the [Apple Computer, Inc.] Macintosh graphics interface, which will give Coordinator users great flexibility in defining their screens.

I see the next generation of Coordinators being tailored for various uses — for example, to keep track of management projects, of cash flow and so on. Or you may want to combine The Coordinator with specific rules that have been in use in a particular organization. I think that's going to create a whole dimension of Coordinators that are going to be designed for different purposes.

How close are we to getting office communications on the right track?

The wall that we face now is a space of conversations, and no one knows how to theoretically assess these conversations. We built our theory in this direction: We said this is not about sending data, it's about completion in action. If you look at it in this different way, you're going to make a big difference.

The problem with The Coordinator right now is that sales representatives and others within companies see the business benefits of The Coordinator right away, but business leaders have not yet realized how big the revolution is. Their interest will increase, however, and then things will change rapidly.

You make what appears to be an interesting reversal in your book. You say that "rationalistic" researchers, those who follow the traditional tenets on which AI is based, are being idealistic. On the surface, that seems a contradiction.

Not at all. We believe we have a different notion of rationality. AI believes that language has nothing to do with rationality, that it's a pure question of mind. They had this idealistic notion and transformed it into a mechanical language.

A good theory is also very pragmatic. For example, the field of thermodynamics is a good metaphor for The Coordinator. The first important thermodynamic machine was the steam engine, invented in the 18th century and developed in the 19th century. The general science of thermodynamics, the principles, are independent of a particular machine.

The Coordinator is a product sold through Action Technologies, but it's also a set of principles. It's going to be the source to begin network design work, and I don't think anything like that has ever happened before in the history of computers. Computers until now were built for one application. They are still one-application machines.

What happens, however, when the network *is* the application in which you are going to have the coordination of people and machines at the same time? How do you operate something like that? With a new dynamic. Single-application machines and the design for single applications are no longer valid. Our theory is useful for designing the next stage.

You mentioned that journalists have not understood what you and Winograd are really trying to do. Do you consider that a fair assessment?

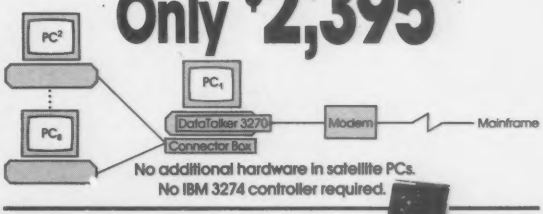
Mostly. Journalists are important in this situation because journalists, whether aware of it or not, participate in the inventing of the future through their continual shaping of language. If journalists begin to see what is really taking place here — that there is also a social phenomenon under way, not just moving data — then everything will be better assimilated.

If journalists continue to describe The Coordinator as a type of electronic mail, however, it will just take more time to make it happen.

3270 MICRO-TO-MAINFRAME 3270

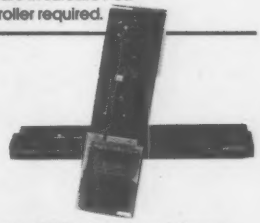
Link 8 PCs to Your Mainframe

Only $2,395



No additional hardware in satellite PCs.
No IBM 3274 controller required.

DataTalker 3270 features
- File Transfer
- 12-32 Logical Sessions
- Application Programming Interface (API)
- 3287 emulation for ASCII printers
- Hot Key



At $2,395, DataTalker 3270 is your most economical micro-to-mainframe alternative. Compare it to the traditional coax board solution:

8 Coax Boards ($595 ea.) . .	$4,760
IBM 3274 Controller, 51C . . .	$4,885
Total	$9,645

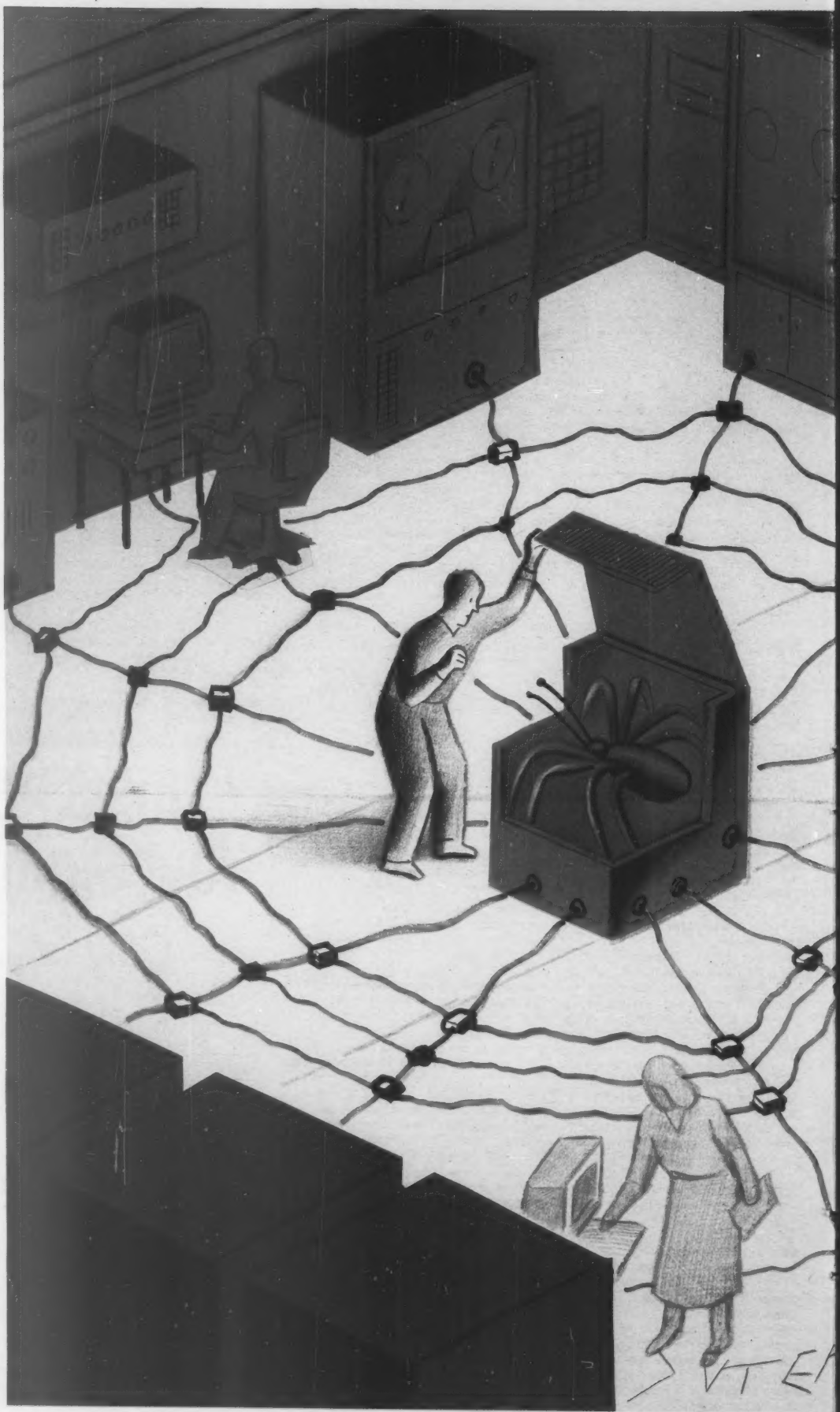
SAVE $7,250!

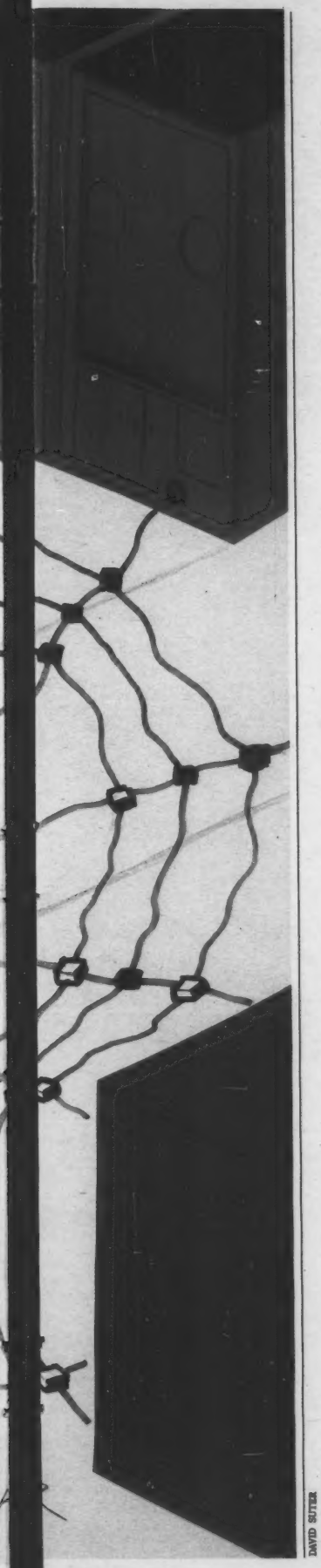
For a FREE micro-to-mainframe guide, call 313/662-2002.
Or mail us this card.

WINTERHALTER INCORPORATED
3796 Plaza Drive, P.O. Box 2180
Ann Arbor, MI 48106

An Interface Systems, Inc. Company

Circle Reader Service Number 8





DAVID SUTER

The thrill of technology, the agony of expense

Networks can sap budgets in no time

BY HELEN PIKE

Welcome to the Wide World of Networking. We take you to the far reaches of technology to bring you the best in the marketplace. We promise you ease of use. Standard protocols. A simple cabling system. Distributed data. Interoperability. Homogeneity. Interconnectivity. Seamless connections in a heterogeneous computing environment. We promise you . . . we promise you . . . we promise . . .

Ah, yes. But do you deliver?

The promise of local-area network technology and the promises from salesmen are hard to separate. Too often, it seems, they get broken. Which is worse: when the technology doesn't live up to its hype, or when a company fails to supply the goods?

Any answer is small consolation when you're faced with justifying unexpected costs in a project gone over budget. Just listen to Chuck McCallar, a computer specialist/programmer analyst for the U.S. Army at Fort Stewart, Ga.

"There's always something missing," McCallar says, ticking off protocols, topologies, maintenance software and the availability of products. Even if "you count everything down to the penny," he continues, "you count your number of personal computers, their add-in cards, Fred's communications software, Joe's modem and someone's homemade cable. You have them all networked together just like the vendor says to do. . . . Then you find out they don't work together. There's a connector that doesn't work, or a glitch on a diskette, or a faulty cable or a power failure.

"The only thing you have left to do is pray," he says, only half in jest.

If hidden costs turned up in the operation of the purchasing department that James Winsness oversees for General Electric Co.'s turbine division, he admits, "I would be out in the street."

Because of uncertainty in the turbine market overall, "we really have to run a lean operation," says Winsness, a system support specialist in Schenectady, N.Y.

Winsness's mandate goes beyond merely controlling inventory. He must keep a tight rein on all costs associated with the purchases of gas and steam turbines, installation of turnkey operations and maintenance of electric power generators. His responsibility encompasses five plants on the East Coast that generate millions of dollars a month in purchase orders.

"Users are not gurus in computers," he observes about the more than 150 PC operators in the purchasing department. "You can't just buy [equipment] because it is 'nice' for the system. It has to be functional."

As Martin A. Smith, who manages information for the University of Massachusetts (UMass), Amherst, set about deciding which comes first — a network's form or its function — he visited a lot of academic institutions. The visits were to competitive schools, ones comparable to his university in size and capacity. But perhaps most importantly, the institutions were ones *he* chose — not ones chosen for him by vendors

Pike is *Computerworld Focus*'s senior writer.

SIEMENS

High-Performance ISDN Networking.

SATURN and CorNet... Powerful Communications Partners.

In a world where increasing competition is surpassed only by rapid technological change, your communications system is your lifeline... to business success today and tomorrow.

For reliable and cost-effective voice and data communications, businesses look to the Siemens SATURN® PBX: one of the most advanced digital communications systems on the market.

Now, Siemens presents one more reason to invest in SATURN.

Introducing CorNet... an ISDN protocol developed by Siemens specifically for corporate networks.

CorNet protects your investment in SATURN by providing a "future-proof" migration path to emerging ISDN networking technology. By standardizing communications in private ISDN networks, CorNet transforms the SATURN PBX into a powerful ISDN networking tool.

The CorNet protocol enhances networking capability by providing SATURN PBX systems with a higher level of feature transparency among compatible multi-vendor products. CorNet ensures clear and rapid voice and data transfer in private networks.

And with CorNet, you can move to ISDN networking technology as soon as you're ready.

For more information, please call or write:
Siemens Information Systems, Inc.
5500 Broken Sound Boulevard
Boca Raton, FL 33487
1-800-327-0636

CCN000-034 WLM 792

Circle Reader Service Number 9

eager to win the UMass contract, which could go as high as $42 million for networking the university's three campuses.

At stake are the voice, data and video communications needs of a burgeoning academic institution; at minimum, UMass requires a 31,300-line network and wiring for 266 buildings. The network will be used by 25,000 students and a combined faculty and administrative staff of nearly 2,800.

By their very nature, "vendors oversell their products," Smith comments. And most MIS managers are not prepared to do the kind of evaluation necessary to come up with the right network, he adds, explaining that his telecommunications background came from on-the-job exposure. Smith, who has been at UMass for 17 years, is director of administrative data processing for the universitywide system and also is assistant vice-president of information management.

"Telecommunications is just a utility. It's got the potential to be great, but it's still in its infancy. There are a lot of software and hardware problems that have to be ironed out," Smith says. "Networking is not an easy, workable product."

Angelo Guadagno, North American sales and marketing vice-president of Apollo Computer, Inc. in Chelmsford, Mass., agrees with Smith's assessment about the promises made about and results expected from networks.

"Start thinking about the future the day you start thinking about installing or upgrading a system."

MARTIN A. SMITH
UNIVERSITY OF MASSACHUSETTS, AMHERST

"Most salesmen are not well trained in selling networks," he observes. Apollo's sales force is trying to make the crossover in selling its technically advanced distributed networking scheme to MIS from its original client base of engineers and scientists. Two of the six days that Apollo's sales staff spends annually in training sessions are devoted to understanding the intricacies of networks and how to sell them, according to Guadagno.

Apollo feels the education effort is necessary, because at the other end of a waiting cable "even the most sophisticated MIS manager [can be] relatively naive in the networking arena," Guadagno says.

Expressing further empathy for the MIS manager facing networking's tribulations, one-time Digital Equipment Corp. executive Guadagno draws the parallel that installing a telephone "is like noise compared to the complexity of putting in a network."

As for all the hype about networks bringing interconnectivity or interoperability among competing vendors, Guadagno says, "For the most part, they're still homogeneous and vendor-specific."

Somewhere amid the cross fire between end users looking at LANs as natural extensions of their PCs and MIS looking at them as systems that have to be maintained are solutions, according to Mark I. Freund, a former IBM communications designer who is now design and engineering vice-president of Interconnect Network Consulting Group, Inc. in Pasadena, Calif.

But first, "LANs should not be treated as a commodity. They're as complex as mainframes. Vendors should price them higher because they have the functions and horsepower of minicomputers," Freund says. Unfortunately, "the hype is that LANs will replace mainframes for the price of a PC.

"Stop thinking they can just be plugged in. . . . LANs are strategic ways to regain resources and control over PCs," he adds. Freund recommends phasing in a LAN, starting first with a small configuration with five nodes as a pilot approach. The LAN can then be upgraded to 10, then 15 nodes, for example.

Another aspect to consider is buying products that adhere to standards, according to Dan E. Ladermann, vice-president of advanced programs for The Wollongong Group, Inc. in Palo Alto, Calif., a software supplier of network products and co-resident operating systems that is championing Unix and the International Standards Organization's Open Systems Interconnect (OSI) standard.

"You should start thinking about OSI now. Otherwise, the hardware is going to be expensive to replace and user training is going to go down the tubes," Ladermann says, referencing 1987 estimates from Dataquest, Inc., a market research concern based in Palo Alto, Calif. Those estimates claim that hardware and software installations that do not have migration paths could cost a company up to $500 million to replace. "Three to five years from now the realities are going to hit," he says.

"Don't make short-sighted decisions," he warns. "If you have 10 users, ask what will happen when you add an 11th node. Or ask when you should go from local-area to wide-area networks and what you should do when you do it. Ask yourself how you're going to get to OSI.

"There is a real need for networks to grow in technology and performance," adds Ladermann, pointing out that customers' performance needs are already changing. "Everyone is going to want to go faster."

Smith at UMass is emphatic about foresight. "Start thinking about the

"...Joiner Associates (Jnet®) has quietly created a viable, tactical approach to IBM-DEC host connectivity."

"The Joiner (Jnet®) approach will satisfy many mainstream user needs for file transfer, printing and job submissions among DEC, IBM, and other processors without major commitments in expenditures, re-education and program development."

George J. Weiss
Program Director
November 20, 1987

GARTNER GROUP, INC.

We couldn't have said it better.

Jnet®

Joiner Associates Inc. 3800 Regent Street, P.O. Box 5445, Madison, WI 53705-0445 USA 608-238-8637
Jnet is a registered trademark of Joiner Associates Inc.

Circle Reader Service Number 10

future the day you start thinking about installing or upgrading a system," he says. Smith began to lay the groundwork for the UMass project four years ago.

"Remember, telecommunications is still in its infancy. The switching components you use today will be outdated probably in five years," he explains. "Recognize the voice and data mix of your users. . . . How flexible do you want the network to be? What will be the capacity for future buildings? Installing a network is largely a construction project."

And it could turn out to be a costly one, Apollo's Guadagno says. "It might cost you $2 million to string $400,000 worth of cable for a $1.5 million computing project because of utility ordinances."

In addition, a corporate user could spend almost $3 million in diagnostic tools for network maintenance when it could be cheaper to buy the diagnostic services from a vendor, Guadagno continues.

Another way to keep the surprise out of connection costs in a multivendor environment, according to Guadagno, is to find out ahead of time if your inside networks from one vendor are to be connected to outside networks from another.

When it comes to figuring out a system's overhead, you need to know the number of lines of code to be written or, at least, what is projected, and the number of lines to be run, he says. I/O speeds and the time it will take programmers to write code are also necessary criteria, he adds.

No less important in getting a network up and running are personnel. As for Apollo, it has a 2,400-node network linking its operations in the northeastern U.S. to counterparts in Europe. Two high-level technicians operate the network, Guadagno says.

But with all the talk about the hidden costs of installing a network, what about the hidden savings?

"Why should I spend between $8,000 to $13,000 for a dedicated file server to handle 20 people? It's silly. I can spend $2,000 for a PC AT [as a file server] for more than 30 people," GE's Winsness says. He oversees a system of six LANs with eight IBM Personal Computer AT-class file servers supporting 150 PC users. The system includes a star LAN configuration carrying seven IBM Systems Network Architecture gateways.

"We keep looking for new technology so as not to get passed by. And we do look for alternatives," he says. But little has come close to what Winsness found by chance — "somewhere between a lark and intelligence," in his words — at Info '84, the Information Management Exposition & Conference in New York. At that time, "people were just starting to talk about LANs. We bought three nodes just to try them out," he says about the purchase of 10Net Communications' 10-Net.

Four years later, Winsness uses 10-Net in a star LAN twisted-pair configuration, which avoids the higher expense of coaxial cable or Ethernet, and a 10Net 10-Gate communications package, which obviates the need for a $10,000 to $13,000 IBM controller card to access the mainframe. "It was physically impossible to put any more cards in our machines," he says.

With the implementation of low networking costs, Winsness uncovered other savings that could be had in the area of software upgrades and new packages. For example, a telecom setup using Enable, a multiapplications package from The Software Group in Ballston Lake, N.Y., is placed on the six file servers to make updated data readily and immediately accessible to all users rather than on a machine-by-machine basis, he says.

Furthermore, "Our file server is there to conduct information, not store it. Back-up responsibilities are up to the end user," he says, pointing out that the PCs used by the purchasing department have no hard drives; the users are given floppies for any storage needs they may have.

Go to the Army for answers

Feeling a bit overwhelmed at this point? Not sure you can promise yourself, let alone your boss, that you will remember to do all of what you've read? Take heart from the experience of the U.S. Army's McCallar.

"It's impossible to know everything. How many [MIS managers] are going to know they need a pseudohomogeneous interface to someone else's proprietary network?"

McCallar recommends putting together a team: a program analyst, a systems analyst and someone representing management or the administration. Select a few good people who possess experience and special talents. Limiting the team members is important because "there's fussin' and cussin' if there's too many," McCallar observes.

"Hire people who've worked at universities at which vendors have given away their equipment for exposure," he advises. Failing that, "go to the outside and hire a consultant . . . then come up with three to five good options to satisfy the majority."

Determine how the network will be used: heavy-duty accounting; marketing, which needs high-resolution graphics and uses artificial intelligence for product strategies; or engineering, which is highly computational intensive.

"So, do you want to build around a mainframe, around a node or around some far-out animal?" McCallar asks, summing up the range of possibilities to be mastered. "Sometimes I think it would be easiest if we all went back to Sanskrit and papyrus." ◆

5 Promises Of Better Service To Computer And Telecommunications Equipment Users

When Encore International opened for business, we had an unusual advantage—a management and staff made up entirely of seasoned industry professionals. Chances are, you already know some of them . . . so you know what our company stands for.

1. Dependability. We thoroughly understand the business of acquiring, reselling, financing and remarketing new and used computer and telecommunications equipment, as well as capital equipment financing for many other assets. And we know that our future rides on our ability to meet every commitment we make.

2. Financial Soundness. From day one, we secured very strong capitalization. In itself, this testifies to the confidence the financial community has in our ability to serve and grow—now and in the future.

3. Objectivity. We draw on the full array of products manufactured by IBM, DEC, Amdahl, AT&T and other industry leaders. With no axe to grind, we can be completely unbiased in recommending products that precisely fit your performance and financial requirements.

4. Value-Added Marketing. We focus on customer needs to achieve the exact balance of product performance and price that best fits them. We know how and where to secure the equipment and financing you need—how to get it at the right price—how to live up to our delivery commitments.

5. Creative Financing. We create financing solutions that meet your business objectives. We also take a realistic approach, at acceptable risk levels, to investment in our own lease portfolio.

For all of these reasons—and because of the unique personal commitments of our people—we believe we can provide you with the finest service you have ever seen in the industry. Please call us at (313) 645-5353.

Encore International, Inc.
Headquarters
21 East Long Lake Road
Suite 110
Bloomfield Hills, MI 48013
(313) 645-5353

Regional Offices
Mission Viejo, California
(714) 582-2957
Sausalito, California
(415) 332-2820
Naperville, Illinois
(312) 717-7377
Grand Rapids, Michigan
(616) 245-9700
Trevose, Pennsylvania
(215) 639-9240
Houston, Texas
(713) 444-0899
Warrenton, Virginia
(703) 349-4042

The Original Cast

Circle Reader Service Number 11

Reading someone else's copy of Computerworld?

Get your own — You deserve it!

YES! I want my own subscription to COMPUTERWORLD. I'll pay just $44 for 51 weekly issues — that's only 86¢ per copy. In addition, I'll receive 12 FREE issues of COMPUTERWORLD FOCUS.

FIRST NAME | M.I. | LAST NAME

TITLE

COMPANY

ADDRESS

CITY | STATE | ZIP

Address shown: ☐ Home ☐ Business

For faster service call 1-800-255-6286! In NJ call 1-800-322-6286.

Canada, Central America & South America $110/Europe $165. All other countries $245 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. **BUSINESS/INDUSTRY** (Circle one)
   - 10. Manufacturer (other than computer)
   - 20. Finance/Insurance/Real Estate
   - 30. Medicine/Law/Education
   - 40. Wholesale/Retail/Trade
   - 50. Business Service (except DP)
   - 60. Government — State/Federal/Local
   - 65. Communications Systems/Public Utilities/ Transportation
   - 70. Mining/Construction/Petroleum/Refining/Agric.
   - 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
   - 85. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   - 90. Computer/Peripheral Dealer/Distributor/Retailer
   - 75. User: Other _____
   - 95. Vendor: Other _____ (Please specify)
2. **TITLE/FUNCTION** (Circle one)
   - **IS/MIS/DP MANAGEMENT**
   - 19. Vice President, Asst. VP
   - 21. Dir., Mgr., Suprv., IS/MIS/DP Services
   - 22. Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   - 23. Dir., Mgr., Suprv., Analyst, of Systems
   - 31. Dir., Mgr., Suprv., of Programming
   - 32. Programmer, Methods Analyst
   - 35. Dir., Mgr., Suprv., OA/WP
   - 38. Data Comm. Network/Systems Mgt.
   - **OTHER COMPANY MANAGEMENT**
   - 11. President, Owner/Partner, General Mgr.
   - 12. Vice President/Asst. VP
   - 13. Treasurer, Controller, Financial Officer
   - 41. Engineering, Scientific, R&D, Tech. Mgt.
   - 51. Sales/Mktg. Mgt.
   - **OTHER PROFESSIONALS**
   - 60. Consulting Mgt.
   - 70. Medical, Legal, Accounting Mgt.
   - 80. Educators, Journalists, Librarians, Students
   - 90. Others _____ (Please specify)
3. **COMPUTER INVOLVEMENT** (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant.
   - A. Mainframes/Superminis
   - B. Minicomputers/Small Business Computers
   - C. Microcomputers/Desktops
   - D. Communications Systems
   - E. Office Automation Systems
   - F. No Computer Involvement

340558-6

Reading someone else's copy of Computerworld?

Get your own — You deserve it!

YES! I want my own subscription to COMPUTERWORLD. I'll pay just $44 for 51 weekly issues — that's only 86¢ per copy. In addition, I'll receive 12 FREE issues of COMPUTERWORLD FOCUS.

FIRST NAME | M.I. | LAST NAME

TITLE

COMPANY

ADDRESS

CITY | STATE | ZIP

Address shown: ☐ Home ☐ Business

For faster service call 1-800-255-6286! In NJ call 1-800-322-6286.

Canada, Central America & South America $110/Europe $165. All other countries $245 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. **BUSINESS/INDUSTRY** (Circle one)
   - 10. Manufacturer (other than computer)
   - 20. Finance/Insurance/Real Estate
   - 30. Medicine/Law/Education
   - 40. Wholesale/Retail/Trade
   - 50. Business Service (except DP)
   - 60. Government — State/Federal/Local
   - 65. Communications Systems/Public Utilities/ Transportation
   - 70. Mining/Construction/Petroleum/Refining/Agric.
   - 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
   - 85. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   - 90. Computer/Peripheral Dealer/Distributor/Retailer
   - 75. User: Other _____
   - 95. Vendor: Other _____ (Please specify)
2. **TITLE/FUNCTION** (Circle one)
   - **IS/MIS/DP MANAGEMENT**
   - 19. Vice President, Asst. VP
   - 21. Dir., Mgr., Suprv., IS/MIS/DP Services
   - 22. Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   - 23. Dir., Mgr., Suprv., Analyst, of Systems
   - 31. Dir., Mgr., Suprv., of Programming
   - 32. Programmer, Methods Analyst
   - 35. Dir., Mgr., Suprv., OA/WP
   - 38. Data Comm. Network/Systems Mgt.
   - **OTHER COMPANY MANAGEMENT**
   - 11. President, Owner/Partner, General Mgr.
   - 12. Vice President/Asst. VP
   - 13. Treasurer, Controller, Financial Officer
   - 41. Engineering, Scientific, R&D, Tech. Mgt.
   - 51. Sales/Mktg. Mgt.
   - **OTHER PROFESSIONALS**
   - 60. Consulting Mgt.
   - 70. Medical, Legal, Accounting Mgt.
   - 80. Educators, Journalists, Librarians, Students
   - 90. Others _____ (Please specify)
3. **COMPUTER INVOLVEMENT** (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant.
   - A. Mainframes/Superminis
   - B. Minicomputers/Small Business Computers
   - C. Microcomputers/Desktops
   - D. Communications Systems
   - E. Office Automation Systems
   - F. No Computer Involvement

340558-6

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 NEPTUNE, NJ 07754

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD
CIRCULATION DEPARTMENT
P.O. Box 1565
Neptune, NJ 07754-9916

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 NEPTUNE, NJ 07754

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD
CIRCULATION DEPARTMENT
P.O. Box 1565
Neptune, NJ 07754-9916

COLLABORATIVE EFFORT

Forum or against 'em?

BY MICHAEL TUCKER

It is the Network Computing Forum. Its aim is nothing less than to blend computing and communications into a single discipline. Its membership includes some of the most important vendors in the industry and many of their biggest customers. The forum is important to MIS because if it succeeds in its stated goals, it could chart the course of commercial computing for years to come.

It is also something of a mystery in that exact definitions of the forum's goals and methods remain a little elusive. Its members, even the most eloquent of them, tend to describe the organization in terms of negatives — it isn't a standards group, it isn't a research and development operation, it isn't a joint venture, it isn't an academic effort, it isn't even a debating society for technologists.

If not, then what is it?

To find out, *Computerworld Focus* recently interviewed several members of the forum and some of its critics. What we found, after several interviews, could best be described as complete and, most of all, ***happy*** chaos.

The Network Computing Forum's (NCF) origin is — in theory — fairly simple. In 1986, Chelmsford, Mass.-based Apollo Computer Corp. announced that it and several associates were forming the NCF to promote intervendor awareness of the concept of network computing.

Network computing, in turn, was defined as the business of making entire networks of dissimilar machines from different vendors act together as if they were a single device. The idea was to make it possible for computer users to run distributed applications on the network exactly as they would run them on a single processor today.

The applications themselves would be divided among the devices within the network so that each task would go to the optimum processor for the job. A numerically intensive operation, for instance, would get flipped to the resident supercomputer. A massive data base problem within the same program, meanwhile, would be routed to a dedicated data base engine. Mainstream data processing would be allocated to the mainframes in the system, while special load-balancing mechanisms would ensure that no one mainframe did more than its share.

And all this activity would be transparent to the user.

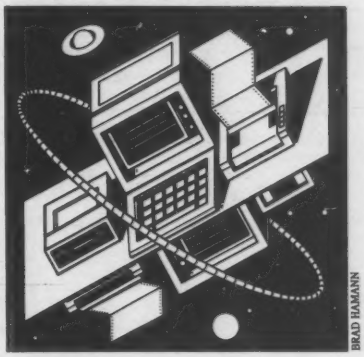
None of this concept, naturally, is new. MIS, among other computer-using groups, has dreamed of this kind of distributed processing capability for years. The vision was that network administrators would someday be able to slip individual machines in and out of the network as easily as today's personal computer users slap boards in and out of their boxes.

But just as naturally, the technology to make distributed processing happen is still largely unavailable. Even so, the lack of R&D necessary to produce results is relatively trivial compared with the task of getting vendors to agree on some method to enable their machines to work together in single systems. Such an agreement would require cooperation between competing computer vendors on a level never matched in the history of the industry. "Unprecedented," says John Robotham, the NCF's managing director as well as the manager of strategic ventures at Apollo, "that's the term I've come up with. It would require unprecedented levels of cooperation."

The need for this kind of cooperation, Apollo says, is precisely the reason that the NCF came into being. The company claims the NCF is a place where all the world's vendors, including direct competitors, may gather and discuss (and *just* discuss) network computing.

"The forum has two functions," Robotham explains. "First, it acts as a lightning rod to attract those who are interested in network computing. Second, it provides a setting in which those people may clarify the issues that need to be addressed to make network computing a reality."

It will not, however, become a standards group, because, Robotham says, "standards organizations tend to deal with what is rather well known. We're right at the state of the art of what can be done. Talking about standards now



BRAD HAMANN

Real motives for Apollo's NCF sought

Tucker is *Computerworld Focus*'s features editor.

COLLABORATIVE EFFORT

would be very premature."

It sounds ideal, even utopian. The NCF is envisioned as a kind of intellectual free-trade zone in which vendors can put aside their rivalries and strive for the common good of vendors and users alike without fear that their own individual good might be at risk.

Marvelous. Terrific. Great.

But is it real?

When Apollo announced the NCF, it was almost uniformly dismissed as an Apollo users group with a curious name. One vendor *Focus* spoke to on the subject actually thought it was a company-sponsored exhibition. "Isn't it kind of like Apollo's Dexpo?" he asked.

This purely cynical view of the NCF has largely faded, mostly because of Apollo's steadfast efforts to present itself as genuinely committed to an open operation.

"Naturally enough," Robotham says, "people came to the first meeting with a healthy dose of skepticism. But that was almost totally eliminated by the end of that meeting."

"Apollo knew that if it came out with this technology by itself, Sun would tag them as yet again coming out with a proprietary technology . . . so Apollo's people realized they had to create at least the illusion of an open forum."

NATHAN BROOKWOOD
D. H. BROWN ASSOCIATES

But even among Apollo's admirers, there are lingering questions about the forum and its real purpose and function. "This [the NCF] all came up a little over a year ago," notes Nathan Brookwood, an analyst with D. H. Brown Associates in Tarrytown, N.Y. "At that time, Apollo was being beaten about the head and shoulders by Sun Microsystems, Inc. Apollo still had several proprietary technologies at that time, and Sun was attacking them while riding the white horse of open systems."

At about that time, too, Apollo was putting the finishing touches on its own distributed computing technology, which, Brookwood claims, was better than what anybody else in the industry could manage. "Apollo knew that if it came out with this technology by itself, Sun would tag them as yet again coming out with a proprietary technology . . . so Apollo's people realized they had to create at least the illusion of an open forum," he explains.

Brookwood isn't convinced, however, that the NCF is an open group. "At least in Apollo's mind, it's open," he says.

Currently, there are more than 100 forum members. Even among the staunchest of these participants, it is possible to find similar reservations about the NCF's openness.

Software vendor Oracle Corp., for instance, was a charter member of the organization. Yet Bruce Cleveland, Oracle's director of Unix product marketing and the company's representative to the forum, finds only faint praise for the NCF's multivendor status. "It's multivendor from a software standpoint, certainly," he notes.

Cleveland also has concerns about the technical value of the forum. "Oracle introduced a distributed data base product last year," he explains, "so, of course, we're interested. But frankly, the NCF is only now starting to talk about things that Oracle is already doing." He feels that membership in the forum is worth the effort (currently, membership is free) but chiefly for the nontechnical reason that it provides a conduit to major workstation users. "In terms of product direction," Cleveland concludes, "the forum has no effect on us. It mostly just provides us with some interesting food for thought."

The pivotal case for the NCF was Sun Microsystems. Because Sun is Apollo's chief rival, its presence or absence would do much to determine whether the forum would be perceived as a legitimate technical effort or just another marketing association.

Sun rises to the occasion

At first it seemed that Sun would remain aloof from its rival's foray into the open systems game. But under pressure from its customers and business partners, Sun soon got involved in a big way — it even sponsored the second major meeting of the forum in 1987. Notes Gordon Short, Sun's manager of strategic alliant marketing and the company's representative to the forum, "We got involved with the NCF because we were approached by several of the firms with which we do business, and their view was that if the NCF lived up to its charter, then it would have great merit."

For Sun, the operative phrase is "if it lived up to its charter." It is an expression charged with more meaning than might meet the eye, because the phrase seems to be Sun's way of saying that the forum must never attempt to force any one technology (particularly Apollo's) on the industry (particularly Sun). In fact, Short describes the NCF as a kind of benevolent anarchy. "It's a place where technical people can exchange ideas. It's a place that provides a pressureless environment

Suddenly You Can Improve Network Efficiency From a Whole New Angle.

Introducing the STEAMER® DM408/T Data Compressor for Triangular Networks.

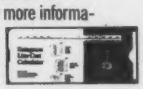
Now you can experience the virtual 100% uptime of triangular networks without suffering the traditional costs and delays.

The DM408/T STEAMER® lets you build triangular networks that offer the advantage of dynamic alternate path routing in the event of link failure.

Because the STEAMER incorporates Datagram's enhanced proprietary compression algorithm, it dramatically reduces the volume of data passed over any individual circuit. That means multiple circuits aren't required between locations to insure adequate network capacity. And because fewer circuits are needed, you have lower network operating costs.

But the STEAMER DM408/T really proves its value during a link failure. Instantly, the DM408/T uses its dynamic alternate path routing to keep your network operational, with no degradation of response time.

So, let us show you how your triangular network can run circles around the rest. Call today for more information and request your free line cost calculator showing you just how much money you can save with the STEAMER.



1-800-235-5030

Datagram
WE MAKE NETWORKS MORE HARDER

USA: 11 Main Street, East Greenwich, RI 02818 (401) 885-4840
Canada and International: 1451 Graham Bell
Boucherville, Quebec, Canada J4B 6A1 (514) 655-3200

Circle Reader Service Number 12

COLLABORATIVE EFFORT

for the exchange of technical data — and that's rather unique."

But, Short says, the NCF is not a standards body and has no power to impose anything on anybody.

Is Apollo trying to do exactly that with the forum? Is the NCF simply a Trojan horse that will lure the rest of the industry to accept Apollo's proprietary technology? Short answers those questions with great delicacy: "Well, it has been *interesting* that we've had to work so hard to make certain that the NCF lives up to its charter."

You can argue about whether the NCF is Apollo's show, but it is beyond question that the NCF is a vendors' show. Few of its members are users. As explained by Del Kunert, Concurrent Computer Corp.'s senior manager for data communications and NCF representative, "It is a group of vendors. I have to be frank, it isn't users. They're not the ones driving this."

Why are vendors, traditionally loath to cooperate with one another, willing to back the forum? "I guess it was the realization on their part that they can either take the initiative and provide the technology for distributed computing now or they can wait and have the users force it on them later," Kunert explains.

There are, however, forum members that don't exactly fall into the vendor category, and these may reveal much about the NCF and its effect. Take, for instance, one of its founding organizations, the Software Productivity Consortium (SPC) in Reston, Va.

> **"It's a place where technical people can exchange ideas. It's a place that provides a pressureless environment for the exchange of technical data — and that's rather unique."**
>
> GORDON SHORT
> SUN MICROSYSTEMS, INC.

The SPC is a curious beast. It is an R&D consortium founded in the early 1980s by an association of advanced computer users — chiefly aerospace firms. These firms had discovered that their computing needs were beginning to exceed what existing technology could do. In particular, they needed reusable code, extremely advanced computer-aided software engineering systems, new methods of networking and so on. They decided to pool their resources, and the result was the SPC, an organization devoted to the creation of extremely sophisticated software engineering tools and technologies.

From the beginning, the SPC had a strong commitment to what the forum would call network computing. It also had long-term associations with Apollo; some of its first investments included Apollo workstations and the Apollo network. So it was no surprise that the consortium became a member of the NCF.

What is interesting is the degree of seriousness with which the SPC regards the forum. First, the SPC's respresentative to the forum, Dennis Gaughn, who is also the consortium's general manager of the development environment division, flatly rejects the notion that the NCF is in any way a single-vendor show. "I emphatically don't want to be associated with *any* vendor's hustle."

Second, the SPC is actively using the forum as a device within which to develop and distribute certain experimental software. Gaughn hastens to explain that this is only test code, not an attempt to create a standard in the way that the X Windows model, for example, is a standard. But still, some rather significant code is now available to NCF members via the SPC. Gaughn notes, "We have a real-time network monitor, a network probe, and something we call Dynabase, which is a high-level abstraction that permits administrators to provide network-level services across a heterogeneous network."

Third, the SPC seems to envision the forum's charter in much broader terms than does Apollo. "Apollo, of course, talks a lot about network computing," Gaughn says. "But for me, personally, it is only a subset of a much bigger issue, which is programming in the large."

Break the mold

Gaughn says that if MIS is ever to be able to really take advantage of distributed computing, then new models of how data processing is done must be developed. "If you are going to run applications on distributed systems, and unsexy systems at that," he claims, "then you cannot do so with conventional DP models. Those just don't stand up. . . . What we want to do is provide highly distributed systems that still exhibit centralized command and control."

And Gaughn says these new models — which may be as political and organizational as they are technological — may be needed in a hurry, because the technology of network computing will soon be upon us. "The future isn't far away," he says. "I'd say 18 months or so. We can already do most of it."

The question then may be whether the forum has taken on a life of its own, quite independent of the organizations that created it, in response to the necessities of the market. As MIS and other users begin the push for distributed computing technology, the NCF could become more of an

We Put More Into
Our Controllers Than Most People
Think Possible

Renex's TMS-one protocol converting controller is packed with ALL of the features you want to have, need to have, and **dream** of having. It's the ultimate in protocol converting controllers.

Take a look:

- Concurrent emulation of 3174, 3274, 5294 and 3767 controllers on multiple synchronous ports at up to 64kb
- Complete IND$FILE protocol support for file transfers
- Complete X.25 support, host PAD/terminal PAD
- Renex Asynchronous Protocol (RAP) for delay-free and error-free transmission across network (X.25) links

There's more...

- Up to 32 internal modems makes a dramatic savings of money and space (No need for modem racks, and modems connect directly into unit)
- Floppy diskette drives provide for easy maintenance
- Up to five simultaneous sessions on each async port (Multiple sessions can take place on any combination of host links)

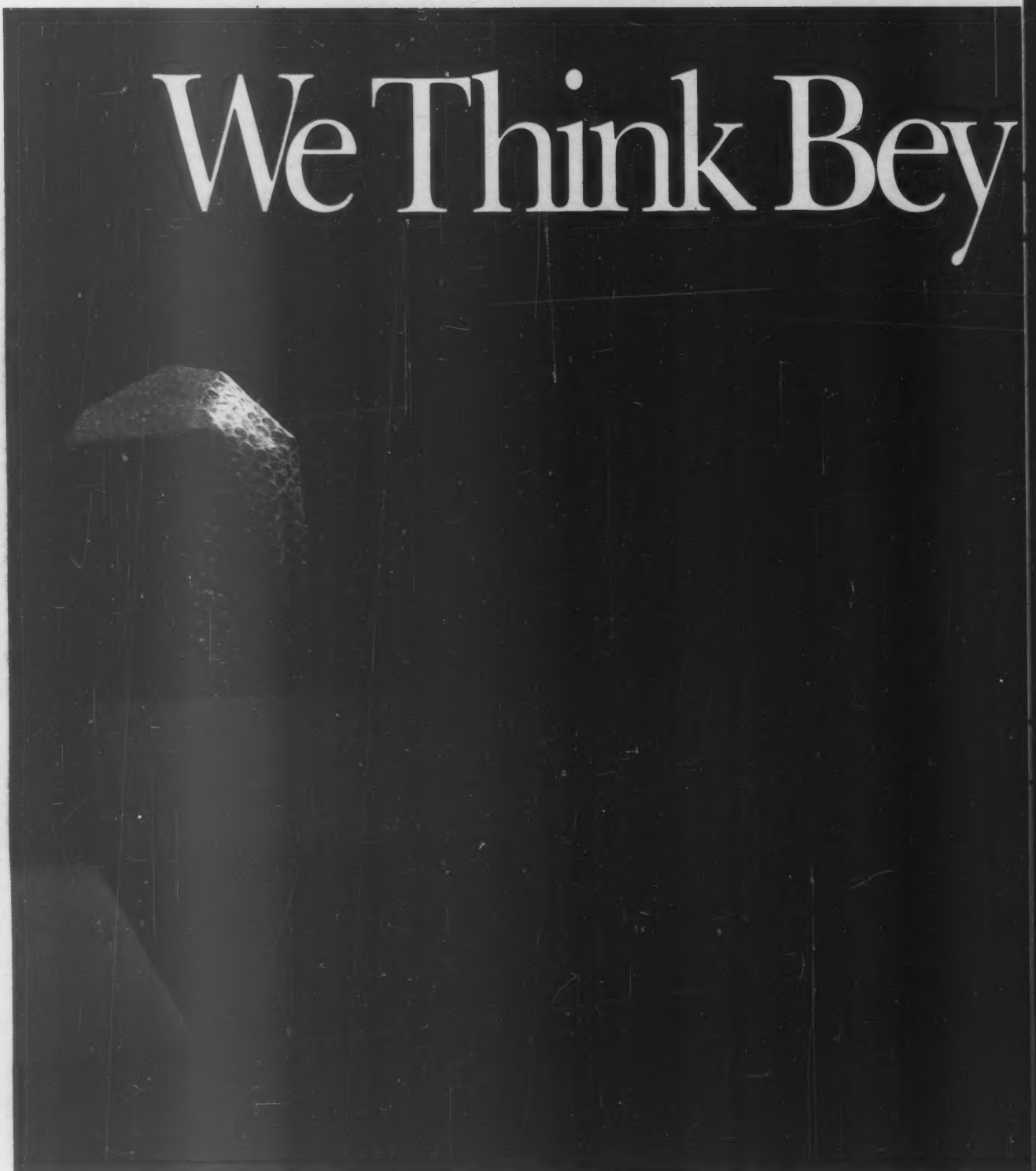
And that's just the beginning!

The TMS-one is the *only* controller that offers you these features—and more—in one powerful, elegant product. For your ultimate micro-to-mainframe solution, call us at (703) 494-2200 or write 1513 Davis Ford Road, Woodbridge, Virginia 22192.

Circle Reader Service Number 13

RENEX
OPENING NEW LINES OF COMMUNICATIONS
MADE IN THE USA * in Woodbridge, VA

We Think Bey



Meet Memorex Telex.

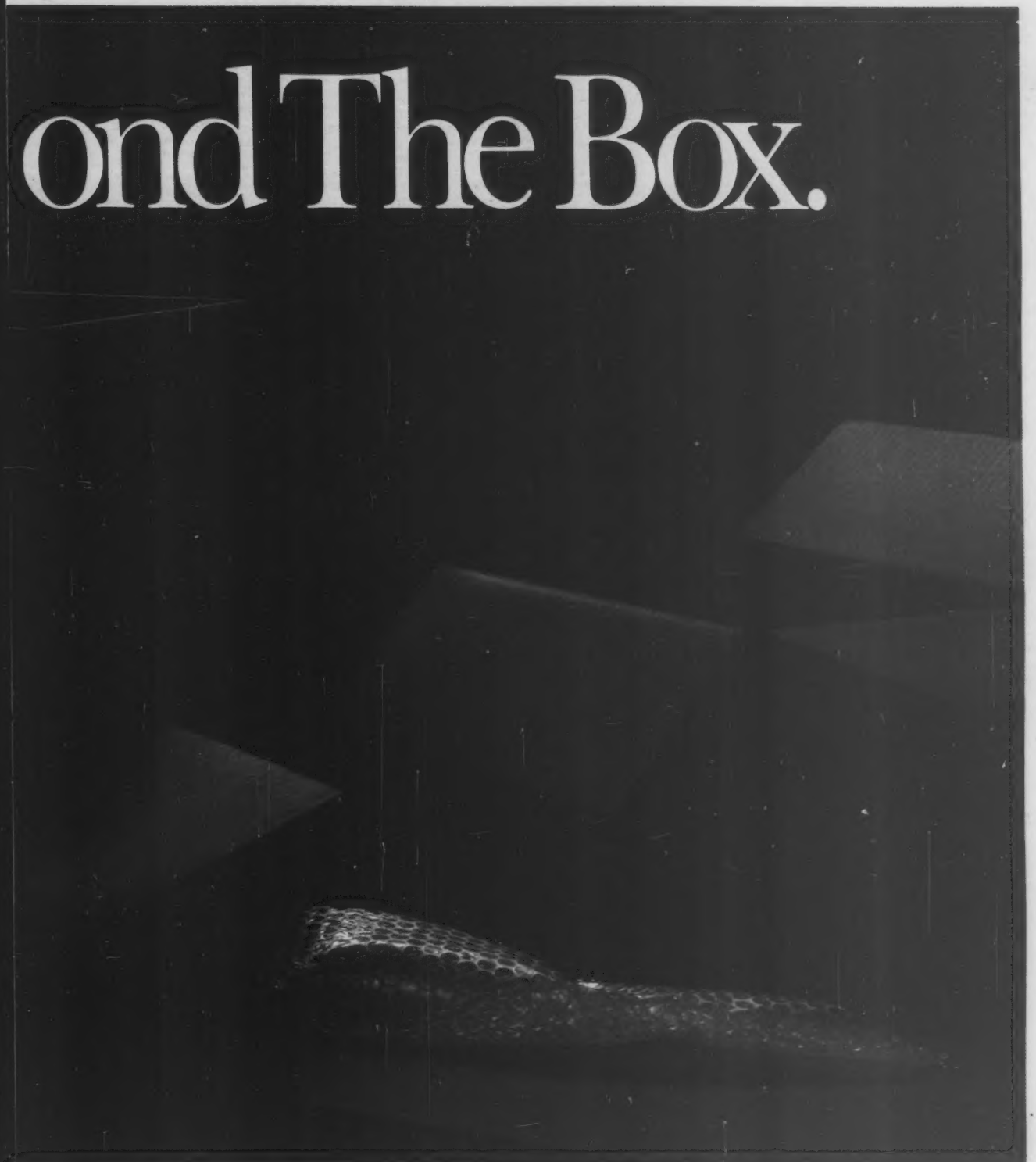
Of course, our products come in boxes, but there's nothing packaged about our thinking. We find creative solutions by thinking beyond the proverbial "box". Standard solutions just aren't up to our standards.

We've got more to offer than an extensive product line. We've got the best dedicated sales and service groups in the industry. And if the right product for your system *isn't* in our line, we'll source it for you and plug it in.

We give you added value in 3270, S/3X, PBX systems, voice-data equipment, airline terminal products, information storage equipment,

© 1988 Memorex Telex

ond The Box.



intelligent workstations and computer supplies.

Part of that added value is our 2000 satellite-linked U.S. customer engineers, available 24 hours a day. Another part is expanded leasing and brokerage options.

Creative solutions don't come in boxes – they come from people who work hard for your business. Us. To hear more about our way of thinking, call 1-800-331-2623, ext. 4530 (in Oklahoma, 1-918-624-4530).

MEMOREX· TELEX

Circle Reader Service Number 14

COLLABORATIVE EFFORT

influence on vendors than they themselves perhaps would like.

"There is no question the industry needs a forum on network computing. And from what we've seen, the NCF is the only game in town," explains Tony Affuso, division manager of technology and strategy for Electronic Data Systems Corp. (EDS) in Bloomfield Hills, Mich. EDS is the giant systems integrator that is both part of and a supplier to General Motors Corp.

Affuso says he thinks that vendors got into the NCF in the first place because "they each tried their proprietary approaches, and they found [that they] didn't sell. So now they'll be trying to be the first to set the de facto standard."

In the process, though, vendors may have made themselves a bit vulnerable. While the NCF may not claim to be a standards organization, it still seems to have become a place where customers can effectively pressure their suppliers. Affuso says, "We're pushing Sun and Apollo, as well as others, to cooperate and develop compatible RPCs [remote procedure calls] and the like, . . . and there's been some progress."

The forum's future

So the real question for the NCF may not be what it is today but what it will become in the future. Its founders steadfastly insist that the NCF is simply what its name suggests — a free and open forum where technical specialists may debate the right methods of providing the distributed computing technology that the industry clearly wants.

Its members have good, if sometimes conflicting, reasons for that to be so. No one of them wishes to give the power of dictating terms to any other. None of them wishes to give any similar power to their customers. Each has every reason to want to keep its industry open, but not so open that it becomes a commodity market in which buyers choose products strictly on price/performance criteria.

Yet there is a real possibility that the NCF could escape its founders' best intentions. Some of its members already seem to be suggesting that the debate within the NCF is powerful in its own right — powerful enough, in fact, to influence vendors in the design of their products. Already, the NCF is shaping up as a vehicle by which customers may force suppliers to listen to their wants and needs.

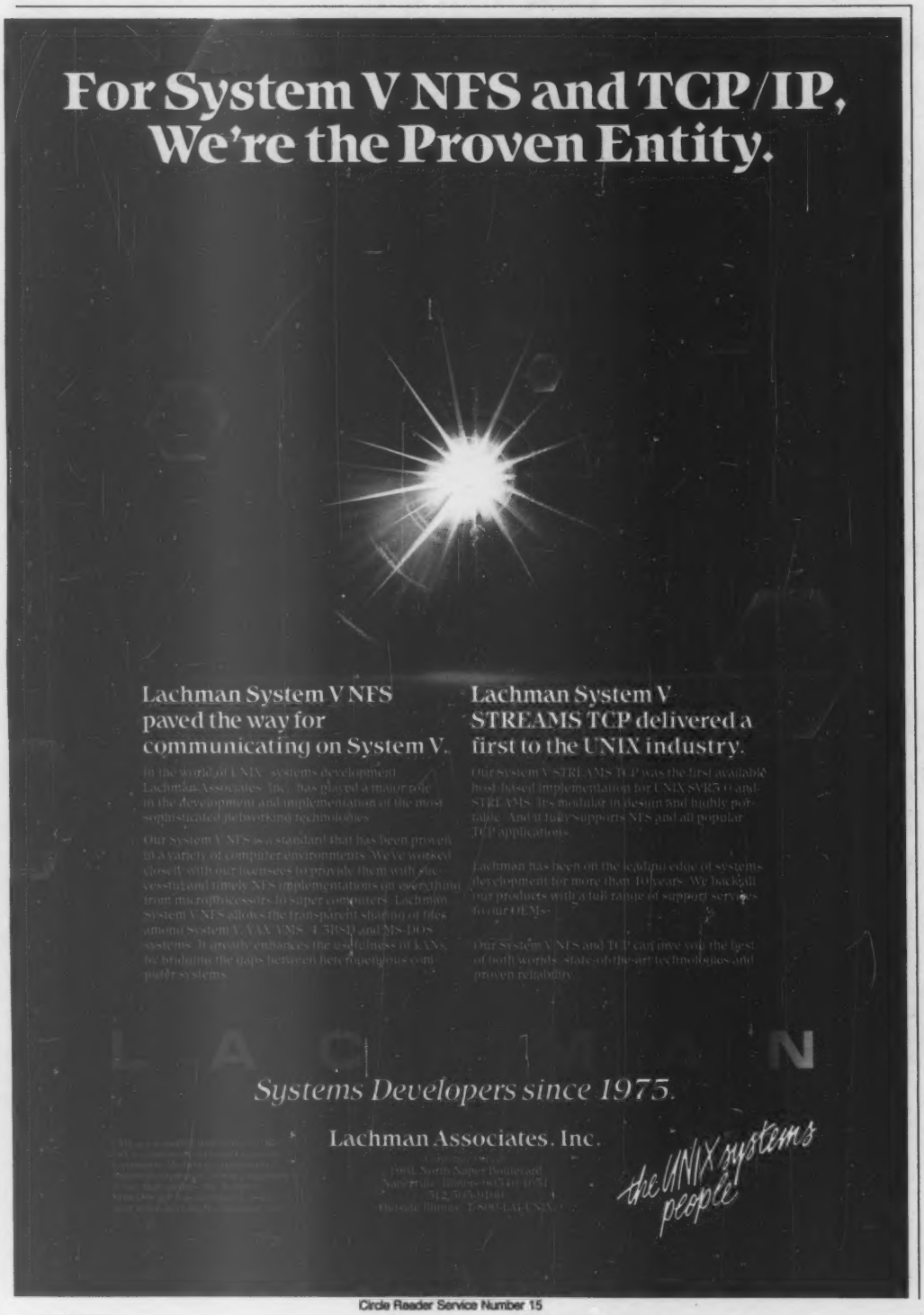
The NCF could also become powerful on what might be called an unconscious level. As an assembly of technologists dealing with technological issues, the forum cannot help but promote common ideas (even if they are competing ideas) among its members. It may be that ideas will be the really important product of the NCF and that they may outlive it.

> **"I emphatically don't want to be associated with *any* vendor's hustle."**
>
> DENNIS GAUGHN
> SOFTWARE PRODUCTIVITY CONSORTIUM

In fact, the forum has taken a rare step for such an organization and has planned for its own demise. Managing director Robotham says that the NCF may become a "two-year renewable project" in which, at regular two-year intervals, NCF members will decide whether the forum has completed its mission and should be disbanded or given a new mission.

The new mission "would be some other topic that will be hot then, in the future. It's premature to say what it might be," Robotham says.

Sun's Short says something similar about the forum's future, but couches it in darker terms. "I think the real issue for the NCF is the factor of people's interest," he warns. "As long as it attracts technical people and keeps them interested, then it will have a healthy life. When and if those technologists get disenchanted and disinterested, then the NCF has a problem." ❖



Circle Reader Service Number 15

The sub-LAN subculture

BY STAN KOLODZIEJ

Hold on. Wait until the salesman has finished talking, then sit back and think carefully. Do you really need the deluxe networking model? Do you need full 10M bit/sec. speed to send data across the network? Do you need to send data to other people at all? Maybe not.

Ah, but the network salesman is talking again, this time about the future, about having room for growth in your network, about how your department, your company, is bound to grow faster than you or any of your coworkers imagined it would. The salesman has conjured up an inspiring image of your network growing in tandem with the prosperity of the company, of playing a conspicuous part, in fact, in its profits. It's an impressive image.

Pull back. You run a small insurance agency, or a medium-size law office or a small graphics department within a large conglomerate. You expect to grow, all right, but maybe not into the kind of mover and shaker that the salesman seems to think.

Fine, but the salesman has taken another tack: You can have your small network, the one that runs at an excruciatingly painful 3M bit/sec., that does not have a dedicated file server and that basically exists to share printers and disk storage for your four brave users. Go ahead, save money, the saleaman says, but you'll be frozen within your network like a fly in amber, unable to grow as competitors and other farseeing departments within your company expand and prosper, plug into large corporate and global networks and find themselves in synch with the future.

This scenaric might suffer from a little writer's license, but it captures the essence of many local-area network sales pitches. Many customers of local-area networks are still being sold on big network trappings when they could easily make do with a small network.

"A lot of my friends were sold on larger LANs, but I didn't find any of them happy with them," explains Rob Edgerton, manager of project scheduling at the Edmonds School District in Edmonds, Wash. "They started running up extra costs, the networks were expensive to service and, in many cases, they were overkill for the work load the networks handled."

Edgerton resisted the pitches of salesmen from the larger LAN vendors and decided to opt for a small four-user storage and printer sharing network called Handshake from Sundance Software, Inc. in Redmond, Wash. (Handshake has since been purchased and renamed Manylink by Netline, Inc., a Provo, Utah, network company.)

"What we came up with is a network tying together one Compaq Computer Corp. Compaq 386, three IBM Personal Computer AT-compatible computers and a Hewlett-Packard Co. plotter and Laserjet printer," Edgerton explains. The Manylink software program resides on each node, or PC, in the network and enables the users to share files at a speed of 19.2K bit/sec.

The reason behind the slow pace is that Manylink is categorized as a serial port local-area link, or LAL, a very easy, inexpensive alternative to regular LANs. Along with the network software, the company provides a cable that attaches between the standard serial ports of the micros, basically transmitting shareable data at regular serial printer port speeds.

Edgerton admits his network does not compare with networks from the likes of Novell, Inc. or 3Com Corp., but his network only cost $350, compared with the lowest quote given him of $7,000 for a full-fledged, four-user LAN.

"We knew we would be doing minimal file sharing and that the emphasis would be on sharing printers," Edgerton says, "so the slow transfer speed doesn't bother us. We know we will be growing slowly, but we can always run cable or use the twisted-pair wiring we already have to expand the network in the future. I think the important thing is that we're happy with it. Others I know are not so fortunate with their more expensive networks."

Sue Scott, project leader in administrative data processing at the University of San Diego, says she also resisted the seductions of large networks to settle on something that was more in line with what she and her colleagues needed.

"We had a significant investment in printers, plotters and other peripherals," Scott explains, "and we share them a lot. We also do a fair amount of word processing but found

RICHARD DOWNS

Small networks may fit the bill

Kolodziej is *Computerworld Focus*'s senior editor.

that we didn't do nearly as much file transfer and sharing of data that some of the other network vendors, such as 3Com, tried to convince us we did."

Scott elected to go with some small two- to 14-node networks from Dayton, Ohio-based 10Net Communications, a division of Digital Communications Associates, Inc. One of the big factors in the decision was price, but she also says 10-Net did not force her, like some other networks do, to centralize all network resources. Just as important was the ability for Scott and others to install the networks themselves.

"One three-node network took us all of an hour and a half to set up and get running," she claims. "With larger networks, I feel much more at the mercy of vendors and consultants."

Robert Nix, president of Ram Labs, Inc., a Tacoma, Wash., consulting firm, says his three-node sub-LAN from Simple-Net Systems in Brea, Calif., cost $1,725. The network replaces a Data General Corp. Desktop 20 system with three terminals. "That DG system cost us $2,400 a year just for a programmer to be on-line for servicing," Nix claims.

Welcome to the club

Scott, Edgerton and Nix probably do not know it, but they are part of a fast-growing area of the LAN industry called the sub-LAN market. The sub-LAN industry has been given a boost from many quarters. In part, it is a reaction to the high costs and complexities of most present-day LAN products; in part, it is a reaction to the poor network software and broken promises from LAN vendors; and in part, it is a result of customers taking a hard look at their networking needs and realizing that, contrary to what vendors seem to say, networking can be handled gradually, one step at a time, instead of from zero to 60.

Sub-LANs are probably not taking anything away from the larger LAN systems market, which experienced healthy growth in 1986 and 1987. It is more a case of the LAN market splintering into a section of larger, more powerful LANs that focus primarily on data sharing and into one of smaller sub-LANs that concentrate foremost on printers and other peripherals.

According to Creative Strategies Research International in Santa Clara, Calif., peripheral sharing is the top priority given by almost 80% of corporate PC users, while only 15% of users list file transfer as their main reason for wanting to be networked. A mere 5% of PC work cluster users gave data base and software sharing as their No. 1 priority, principally because in most large firms these functions are already served through micro or terminal-to-mainframe links.

Other research indicates that fully two-thirds of typical PC department work clusters have from two to 10 PCs, with only a few having more than 10. Watertown, Mass.-based sub-LAN vendor Digital Products, Inc., for example, says its findings reveal that most PC users are clustered in small contained work group units, the majority of which have fewer than 30 users. It is such consistency in work group operating numbers that has helped make the sub-LAN market a hot one. It is also why many of the large-network vendors have stumbled in trying to sell the "bigger is better" pitch.

Peripheral sharing is not just a concern for the smaller, less sophisticated network customer, however. Most companies want their users to improve their ability to share peripherals, especially expensive laser printers, hundreds of thousands of which are now being bought by U.S. corporations annually.

The cost of laser printers, which can run in the thousands of dollars, can be defrayed by printer sharing over networks, which also provides a method to gradually move users away from slower dot matrix printers. The same holds true for high-speed modems, whose costs can also be offset by the use of sub-LANs.

"What I see happening is a split in the LAN market," explains Doug Gold, senior LAN research analyst for International Data Corp., a Framingham, Mass.-based research group. "The main LAN market now consists of Novell, 3Com, IBM and some other vendors that are trying to provide the backbone networking ingredients for large customers. Underneath all this are the sub-LAN vendors.

"The backbone network vendors are trying to establish their territory as providers of everything from LANs to links into large wide-area and value-added networks," Gold says. "Being known simply as a LAN vendor now is not enough. Becoming enterprisewide network providers is important. That gives vendors heavier marketing leverage with customers."

Gold does not place much faith in the future of sub-LANs, believing they will settle into catering to a niche market of small mom-and-pop shops. He says the market is destined to grow slowly, soon to become saturated with too many vendors chasing too few customers.

"What you have is a ready-made market of small customer sales that will never need to expand into full-fledged networks," Gold says. "That market is being abandoned by the larger [LAN] vendors."

Gold might have a point. Even established low-end LAN network technologies such as Arcnet and AT&T's Starlan are undergoing changes brought on by market pressures. As LAN speeds increase faster than the rise in their costs, 10M bit/sec. is becoming the accepted industry standard. Although Arcnet, and especially Starlan, have built their reputations on providing smaller, lower cost LANs that can interface with larger high-speed networks, they might be losing ground in the shifting LAN market Gold describes.

As the market divides more clearly into two segments, Arcnet and Starlan have found themselves more isolated in the middle, unable to satisfy either the high-end or sub-LAN markets. At a painfully slow 1M bit/sec. and 2.5M bit/sec., respectively, basic Starlan and Arcnet have been unable to effectively compete in past years against the speedier Ethernet, IBM Token-Ring or Novell networks.

As network customers began concentrating on the installation of smaller networks, Novell and IBM made inroads into departments of large corporate accounts, which were originally the target markets of Arcnet and Starlan, taking away much of their potential business. Arcnet and Starlan vendors could not retreat, however, for behind them was a big drop to the smaller companies that Gold mentions, a market that holds less chance for the kind of spectacular future network growth the larger accounts promised.

> **"With most sub-LANs, you get quick payback because they're so cheap. You can scrap a sub-LAN and start again without suffering much in the wallet. Or you can build with what you have."**
>
> ALAN LISHENSKY
> COMPUNET COMMUNICATIONS CO.

While Starlan and Arcnet have been garnering their share of support from third-party vendors, the emphasis recently has been on increasing the speed and functionality of the basic Arcnet and Starlan technologies. HP, for example, has boosted Starlan's speed to 10M bit/sec., and a growing coterie of companies, like Mountain View, Calif.-based Tiara Computer Systems, Inc., has been producing such add-ons as adapter cards to plug IBM Personal System/2s and IBM's Micro Channel architecture into Arcnet, trying to keep the network in step with the times.

Datapoint, the developer of Arcnet, on the one hand has increased the capability of Arcnet but on the other hand has recently adopted a more open network scheme around official standards such as Unix in an effort to win back large corporate accounts.

Under market and user pressure, AT&T has announced that it will also introduce a 10M bit/sec. version of Starlan this year. AT&T's push to enterprisewide networking is reaching fever pitch, and it is clearly pushing Starlan ahead as an important component of its corporate networking strategy. If there were any doubts about Starlan truly cutting away from the small-LAN market, they probably ended with the 10M bit/sec. announcement.

Despite such refurbishing of Arcnet and Starlan, Gold thinks sales will slow in the coming years. It is now possible, for example, to supply stable, advanced 10M bit/sec. Ethernet over the basic unshielded twisted-pair wiring found in most offices. Arcnet also has not found the kind of support at the official standards committee level that Datapoint and other Arcnet adherents had hoped.

"I wouldn't count Starlan and Arcnet out just yet, however," cautions Andrea McCurdy, a research analyst at the Yankee Group in Boston. "The LAN market is changing, and I think the target markets of Arcnet, and especially Starlan, are also changing. I think AT&T is aiming Starlan at backbone [network] applications, and Arcnet vendors might continue targeting smaller installations with success. It really depends now on how they are marketed."

In the meantime, Novell, probably to be followed by other LAN vendors, has entered the sub-LAN market. Novell has targeted small corporate work groups with its Entry Level System Netware 286 Level 1 network, which the company says gives four users file, printer and storage sharing for about $595 a node, well within the price range of many sub-LAN systems.

Novell thinks there is a strategic element to be derived from tapping into the entry-level networking in large corporations. Such small beginnings could pan out later as the sub-LANs grow into more enterprisewide concerns — with Novell's assistance.

This sort of market thinking doesn't surprise Alan Lishensky, president of Compunet Communications Co., an Austin, Texas, network consulting firm. Lishensky says he has installed sub-LANs in several large companies that have been enthralled with the networks' capabilities and low cost per node. The difference today, he says, are the options available in the under-10-user, or sub-LAN, arena.

"I tell clients not to get swept away by LAN salesmen," Lishensky explains. "The big thinking is to meet [networking] objectives. I've found the break point in networking to be 10 users. Under 10 users and over 10 users are different worlds requiring different file and peripheral sharing schemes and network goals."

Keep it simple

As for Starlan, Lishensky says there will continue to be a definite market for the product on the basis of ease of use alone. "A Starlan adapter card is designed so that you can simply plug a wire from your wall phone jack into your computer, and, after a few more basic steps, boom, you're cabled and ready to go," he explains. "Very easy. There will always be a place for easy-to-install networks."

For an average cost per node of between $300 and $500, compared with larger LAN node costs of up to $2,000, sub-LANs can no doubt buy a lot of faith on price alone.

But what about the oft-cited bugaboo that users of sub-LANs will be locked out of future expansion or merger with larger networks?

"Expansion is not an issue," McCurdy says, adding that users can keep reconfiguring and growing with sub-LANs as with any other networks.

"I don't think people quite know how much is available and how much flexibility they have," Lishensky says. "I can start with a Knowledgenet network [from Applied Knowledge Groups, Inc.] at $150 a PC, then move up to a Western Digital Corp. Starlan [licensed from AT&T] running Western Digital's Vianet operating system for about $400 to $500 a PC, and then up to an Ethernet, IBM Token-Ring or Arcnet network running Vianet or Novell Netware. If it's convenient for the client, I could plug in a network half of which is Arcnet, half Starlan and throw in a gateway to the mainframe.

"With most sub-LANs, you get quick payback because they're so cheap. You can scrap a sub-LAN and start again without suffering much in the wallet. Or you can build with what you have," he says.

Others urge caution, however. Diane Zytniak, a consultant with Steiner & Associates, a Bothell, Wash.-based computer consulting firm, says she would be reluctant to recommend using a sub-LAN for, say, a 20-user network. "There are definite expansion limitations with these systems," she declares.

For Lishensky, the biggest trade-off with small LANs is speed. "But a lack of good file lockout facilities can also be a problem," he adds. "The thing to remember is that sub-LANs are a good way to get a feel for networks before you go on to bigger network projects. That's important in itself." ✧

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 124 DALTON, MA 01227

POSTAGE WILL BE PAID BY ADDRESSEE

Computerworld Focus
Post Office Box 300
Dalton, MA 01227-9882

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 124 DALTON, MA 01227

POSTAGE WILL BE PAID BY ADDRESSEE

Computerworld Focus
Post Office Box 300
Dalton, MA 01227-9882

COMPUTERWORLD FOCUS

Reader Service Card
Issue: May 4/Expires: July 13, 1988

Please Use This Card For Product Information

Name _____ Title _____
Company _____ Phone _____
Address _____
City _____ State _____ Zip _____

A. Please check the business/industry in which you work: (check one)

End Users
1 ☐ Manufacturer (other than computer)
2 ☐ Finance/Insurance/Real Estate
3 ☐ Medicine/Law/Education
4 ☐ Wholesale/Retail/Trade
5 ☐ Business Service (except DP)
6 ☐ Government - State/Federal/Local
7 ☐ Public Utility/Communication Systems/Transportation
8 ☐ Mining/Construction/Petroleum/Refining
9 ☐ Other User _____ (please specify)

Vendors
10 ☐ Manufacturer of Computers, Computer-Related Systems or Peripherals
11 ☐ Computer Service Bureau/Software/Planning/Consulting
12 ☐ Computer/Peripheral Dealer/Distributor/Retailer
13 ☐ Other Vendor _____ (please specify)

B. Please check your main job function: (check one)
1 ☐ Corporate Management
2 ☐ Financial Management
3 ☐ MIS/DP Management
4 ☐ MIS/DP Operations
5 ☐ Data Communications Management
6 ☐ Data Communications Operations

C. Reason for this inquiry: (check one)
1 ☐ Immediate purchase
2 ☐ Future purchase
3 ☐ Information only

D. Is this your personal copy of Computerworld Focus? (check one)
1 ☐ My personal copy
2 ☐ I'm a pass-along reader

E. Please check the number of employees in your company: (check one)
1 ☐ Over 1,000 employees
2 ☐ 501-1,000 employees
3 ☐ 500 or under

Circle the # that corresponds to the number at the bottom of the item in which you are interested.

1	21	41	61	81	101	121	141	161	181
2	22	42	62	82	102	122	142	162	182
3	23	43	63	83	103	123	143	163	183
4	24	44	64	84	104	124	144	164	184
5	25	45	65	85	105	125	145	165	185
6	26	46	66	86	106	126	146	166	186
7	27	47	67	87	107	127	147	167	187
8	28	48	68	88	108	128	148	168	188
9	29	49	69	89	109	129	149	169	189
10	30	50	70	90	110	130	150	170	190
11	31	51	71	91	111	131	151	171	191
12	32	52	72	92	112	132	152	172	192
13	33	53	73	93	113	133	153	173	193
14	34	54	74	94	114	134	154	174	194
15	35	55	75	95	115	135	155	175	195
16	36	56	76	96	116	136	156	176	196
17	37	57	77	97	117	137	157	177	197
18	38	58	78	98	118	138	158	178	198
19	39	59	79	99	119	139	159	179	199
20	40	60	80	100	120	140	160	180	200

☐ I have circled #200 on the Reader Service Card to enter my *Computerworld* subscription for one year, 51 weekly issues and 12 *Computerworld Focus* issues for $44 and please bill me later. This rate valid only in the U.S.

①

COMPUTERWORLD FOCUS

Reader Service Card
Issue: May 4/Expires: July 13, 1988

Please Use This Card For Product Information

Name _____ Title _____
Company _____ Phone _____
Address _____
City _____ State _____ Zip _____

A. Please check the business/industry in which you work: (check one)

End Users
1 ☐ Manufacturer (other than computer)
2 ☐ Finance/Insurance/Real Estate
3 ☐ Medicine/Law/Education
4 ☐ Wholesale/Retail/Trade
5 ☐ Business Service (except DP)
6 ☐ Government - State/Federal/Local
7 ☐ Public Utility/Communication Systems/Transportation
8 ☐ Mining/Construction/Petroleum/Refining
9 ☐ Other User _____ (please specify)

Vendors
10 ☐ Manufacturer of Computers, Computer-Related Systems or Peripherals
11 ☐ Computer Service Bureau/Software/Planning/Consulting
12 ☐ Computer/Peripheral Dealer/Distributor/Retailer
13 ☐ Other Vendor _____ (please specify)

B. Please check your main job function: (check one)
1 ☐ Corporate Management
2 ☐ Financial Management
3 ☐ MIS/DP Management
4 ☐ MIS/DP Operations
5 ☐ Data Communications Management
6 ☐ Data Communications Operations

C. Reason for this inquiry: (check one)
1 ☐ Immediate purchase
2 ☐ Future purchase
3 ☐ Information only

D. Is this your personal copy of Computerworld Focus? (check one)
1 ☐ My personal copy
2 ☐ I'm a pass-along reader

E. Please check the number of employees in your company: (check one)
1 ☐ Over 1,000 employees
2 ☐ 501-1,000 employees
3 ☐ 500 or under

Circle the # that corresponds to the number at the bottom of the item in which you are interested.

1	21	41	61	81	101	121	141	161	181
2	22	42	62	82	102	122	142	162	182
3	23	43	63	83	103	123	143	163	183
4	24	44	64	84	104	124	144	164	184
5	25	45	65	85	105	125	145	165	185
6	26	46	66	86	106	126	146	166	186
7	27	47	67	87	107	127	147	167	187
8	28	48	68	88	108	128	148	168	188
9	29	49	69	89	109	129	149	169	189
10	30	50	70	90	110	130	150	170	190
11	31	51	71	91	111	131	151	171	191
12	32	52	72	92	112	132	152	172	192
13	33	53	73	93	113	133	153	173	193
14	34	54	74	94	114	134	154	174	194
15	35	55	75	95	115	135	155	175	195
16	36	56	76	96	116	136	156	176	196
17	37	57	77	97	117	137	157	177	197
18	38	58	78	98	118	138	158	178	198
19	39	59	79	99	119	139	159	179	199
20	40	60	80	100	120	140	160	180	200

☐ I have circled #200 on the Reader Service Card to enter my *Computerworld* subscription for one year, 51 weekly issues and 12 *Computerworld Focus* issues for $44 and please bill me later. This rate valid only in the U.S.

②

Hot on the heels of corporate success

Apple allies itself with DEC, IBM

BY DAVID KOSIUR

During the past year, Apple Computer, Inc. has been making strong moves into the connectivity arena in an effort to prove that its Macintosh computer can coexist with other business machines. Recognizing that the Mac cannot function in corporate MIS environments as an isolated processor, Apple has chosen to provide a range of solutions for departments that use Digital Equipment Corp. or IBM computers. These solutions begin with simple connectivity and move on to the more sophisticated concept of cooperative processing, or the ability for two different machines to work on the same problem in concert. Apple Computer, along with its cadre of third-party developers, has become one of the first to display applications that bring the power of cooperative processing to desktops.

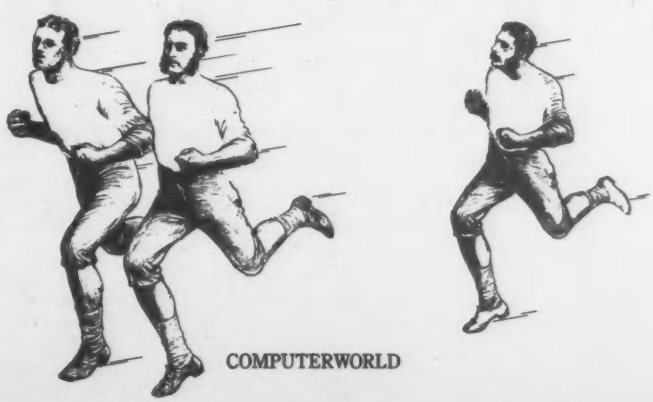
Most DEC VAX users will admit that there's a commonality of attitude between themselves and Mac users. Repeated surveys point out that a large percentage of VAX installations also have Macintoshes (although they probably also have IBM Personal Computers and compatibles). The ease of using a VAX's VMS operating system likely encourages users to look for easy and straightforward ways of computing at their desks, which is typified by the Macintosh's desktop and menu interface. This commonality goes beyond an easy-to-use operating system, for both types of computers include a heavy emphasis on networking. VAXs come from the company that, thanks to Digital's Decnet, "has it now" in terms of connectivity. Every Macintosh comes with Apple's Appletalk network protocols built in.

Much has been written about the recent DEC-Apple strategic development alliance, which is expected to bear fruit in about nine months to a year. The joint effort will focus on distributed applications methodology, network management, networking, file sharing, document interchange, data base access and terminal emulation.

In the meantime, both Apple and others have produced connectivity solutions that can link VAXs and Macintoshes together in an effective manner.

A VAX shop can easily progress beyond simple emulation of DEC VT100 and VT220 terminals with a Macintosh by utilizing either Decnet or Appletalk. Current hardware lets MIS install either a gateway between an Appletalk network and Ethernet with Fastpath from Walnut Creek, Calif.-based Kinetics, Inc. or use one-on-one connections with boxes, such as Kinetics' EtherSC and Wilmington, N.C.-based Dove Computer Corp.'s Fastnet, or boards, such as Kinetics' Etherport SE, Etherport II or Apple's own Ethertalk. Twisted-pair Ethernet is not far away either, with Kinetics employing Synoptics

Kosiur is the publisher of "Connections," a newsletter based in Fullerton, Calif., on Apple Computer, Inc. Macintosh-based networking.



GLENN JOHNSON

Communications, Inc.'s transceiver on a card for the Apple Macintosh SE.

If MIS wishes to use a Macintosh as a Decnet node, both Arlington, Texas-based Thursby Software Systems' TSSnet and Community Mac from Technology Concepts, Inc. in Sudbury, Mass., should fill the bill. Both products allow a Mac to become a full-fledged end node on Decnet, and the user, who needs to know a little bit about Decnet, can approach it from the familiar angle of the Macintosh interface. Both products offer such utilities as background file transfers and task-to-task communications.

On the other hand, Apple has also seen fit to implement its Appletalk protocols for VMS so that a VAX can become a participant in existing Appletalk networks over Ethernet. Appletalk for VMS has already served as the foundation for two products — the Alisatalk file- and print-server system from Alisa Systems, Inc. in Pasadena, Calif., and Northbrook, Ill.-based Odesta Corp.'s Helix VMS, a VMS data base that uses the Macintosh as a front end. (Another series of products, Pacershare and Pacerlink from Pacer Software, Inc. in La Jolla, Calif., use the firm's custom drivers but may soon use Appletalk for VMS.)

With these products, Mac users can view VAX disk partitions as normal Macintosh volumes and can exchange certain files with VAX users. Helix VMS, in particular, displays the power of this concept. It allows Mac users to utilize the normal Helix data base interface while VT220 users can access the same data base, resident on the VAX, with their own custom screens.

This concept of allowing the Mac to act as a front end for other computers and applications is where the newest products in cooperative processing and connectivity are likely to show their power. The Mac's interface has finally achieved acceptance in various markets; if nothing else, IBM and Microsoft Corp.'s efforts at producing Macintosh-like interfaces in their newest microcomputer operating systems have lent credibility to this interface. Apple and its co-developers have seen to it that their connectivity products will provide a Macintosh interface to users of distributed processes.

In the DEC arena, Helix VMS has been joined by Alisa Systems' Sequelink and Cupertino, Calif.-based Network Innovations Corp.'s CL/1. Sequelink was designed to allow a Macintosh user to use familiar Macintosh applications, like Apple's Hypercard and Cupertino-based Acius, Inc.'s 4th Dimension, to extract data from VAX-based SQL data bases, such as Oracle Corp.'s Oracle. The user does not need to know SQL, and the VAX does not need to transmit all of the data base over the network to the user; only the necessary data is extracted and sent.

CL/1 goes a bit further by providing access to a variety of IBM SQL and non-SQL data bases and can be programmed to deal with DEC's VAX RMS files and applications. But throughout this activity, the Mac user sees only the familiar interface and, therefore, can remain more productive than if he were struggling with SQL commands or the vagaries of a mainframe's operating system commands.

MIS control

The data base stays on the VAX where it belongs so that MIS departments can control it and archive it, but the user can more easily extract what is important to him, namely, the data. Training resources can be better utilized, because the Mac user can extend his knowledge gained from Mac-based applications to obtaining data from the mainframe. In addition, system resources are taxed to a lesser degree than if each user were using a terminal to communicate with a VAX data base.

Admittedly, not everyone is going to rush out and purchase these products for cooperative processing between Macintoshes and VAXs. However, for those willing to admit that the Mac interface can be more effective for the end user than standard text-based screens, Apple has yet another product that should appeal to MIS departments and users alike: the Macworkstation.

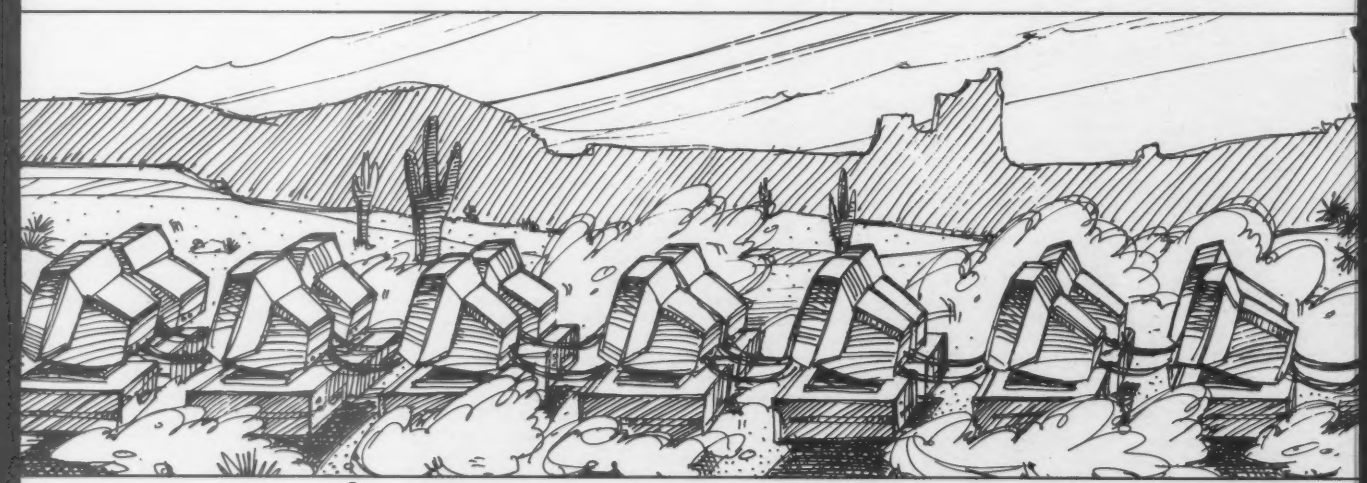
The Macworkstation was designed to provide a Macintosh interface to existing mainframe applications with a minimum of recoding. The package can act as the middleman by accepting an existing program's I/O commands and sending mnemonics to an attached Mac, which in turn generates the customary windows, menus and dialogue boxes found in Macintosh applications. By using mnemonics, which the Mac program can understand, Macworkstation keeps the traffic down to a minimum. The Mac and the host can be connected via either a network or an asynchronous link.

What can users expect next in the Apple-DEC market? When Appletalk was first developed, its creators did not expect to see large networks of hundreds of workstations using Appletalk. That has changed, and Appletalk's protocols and tools are continually being enriched. The protocols can be run over just about any media, including twisted-pair, Ethernet coaxial and fiber-optic cable.

Let me see the manager

However, if there is anything that Appletalk is lacking, it is network management. The Apple-DEC alliance should address that deficiency, at least for those users linked into Decnet. First, Appletalk will be integrated into DEC's own wide-area network systems. Then, as both companies blend their products into the International Standards Organization's Open Systems Interconnect model, management of Appletalk and Decnet will become more unified.

One other shortcoming that is common to the personal computer world — and the Macintosh is no exception — is that of integrating electronic mail systems. Local-area networks are leading to the proliferation of E-mail, but corporations are justifiably more



ARBITER®. BECAUSE TRUE COOPERATIO

There are dozens of programs that allow connections between PCs and hosts.

Arbiter® hitches them together into a powerful processing team.

Arbiter is the IBM® SNA-compatible cooperative processing VTAM subsystem that provides centralized support and services for growing micro/mini/mainframe networks.

Thousands of PC users can now tie into the resources of the host without overloading it because Arbiter lets your PC share processing duties with the host. And Arbiter does this through virtually any protocol converter, SDLC or coaxial adapter, or LAN gateway.

In short, Arbiter permits more than mere connection. It empowers cooperation.

HARNESSED TOGETHER, YET FREE TO RUN

Arbiter provides a single, flexible communication interface between PCs and VM/MVS hosts. The result is a centrally administered and controlled PC network where processing tasks are shared according to the strengths of the PC and host, and not limited by the host connection. This is accomplished with low host overhead while achieving transfer rates unmatched by TSO, CICS, and CMS-based "links".

Depending on the user's needs, Arbiter delivers a vast range of advanced services, such as peer-to-peer communications between PCs and APPC (LU6.2) environments like CICS, S/3x, and token ring LANs.

Arbiter supports transparent data access and file transfer between the PC and host, either through virtual disks or directly with host files.

comfortable with mainframe-based E-mail systems. Communications between Macintosh mail applications and similar DEC services, such as DEC's All-In-1 and Mailbus, should come out of the DEC-Apple pact. (Other developers of mail applications are now looking to the developers of mail gateways as the next step in linking disparate systems.)

DEC's All-In-1 office automation system should become more tightly coupled to the Mac. Telos Corp. in Santa Monica, Calif., has already provided a step in this direction by creating Macnow, an All-In-1 interface for the Mac, and Keyword Office Technologies, Ltd. in Calgary, Alta., Canada, now offers an All-In-1 interface as an addition to its document translation facilities.

IBM not Ignored

While courting DEC technology, Apple has not ignored IBM and its bevy of computers. In fact, Apple promises that its new connectivity products this year will be largely devoted to IBM systems. Again, standard terminal emulation capabilities are available, mainly from third parties, whether they be for IBM 3278, 3279 or 5150 terminals. Either protocol converter boxes for the older "closed" Macintoshes or boards for the newer "open" Macintosh SEs and Macintosh IIs can be used. Some products have advanced to providing multiple session support. It is surprising, however, that the Macintosh, which admittedly excels in graphics, has yet to provide support for IBM distributed function terminal, or DFT, style terminals or IBM mainframe graphics protocols.

Ottawa-based Simware, Inc. has also extended its support of dial-in access to IBM mainframes to the Macintosh, providing another level of connectivity to remote users. The emulation scripts written using Simware's Sim3278 software can be exchanged between Microsoft MS-DOS and Macintosh machines, making it easier to support the two computers.

Apple's MacAPPC debut at the Infonetics Desktop Communications Conference sheds some light on where Apple is headed in the IBM arena. By using a coprocessor board in a Mac II as a gateway, Apple provides an implementation of LU6.2 and PU2.1 that can be used by a series of Macintoshes connected via Appletalk.

However, Apple provides only the basic platform and expects third-party developers to build their applications atop it; thus the wait for useful products will be longer. In the interim, Apple appears to be committed to move beyond its initial support of IBM Synchronous Data Link Control and support IBM Token-Ring and other links.

Both Apple's MacAPPC and Richardson, Texas-based Northern Telecom, Inc.'s Lanstar for the Macintosh are front-runners in what will most likely be the prevalent approach to connectivity in the Apple camp, namely, the use of a coprocessor board in a Mac II. Designed to allow the Macintosh II to function as a regular workstation, these products are a convenient marriage between the simplicity of Appletalk networks for locally restricted networks and the power and range of other systems, such as private branch exchanges and token-ring networks, that may already be a part of the corporate infrastructure.

Bringing the ease-of-use features found in the Macintosh interface to desktop computers has admittedly strained developers' resources, and extending these features to networking and cooperative processing might not be any different. However, Apple is looking to change even those rules.

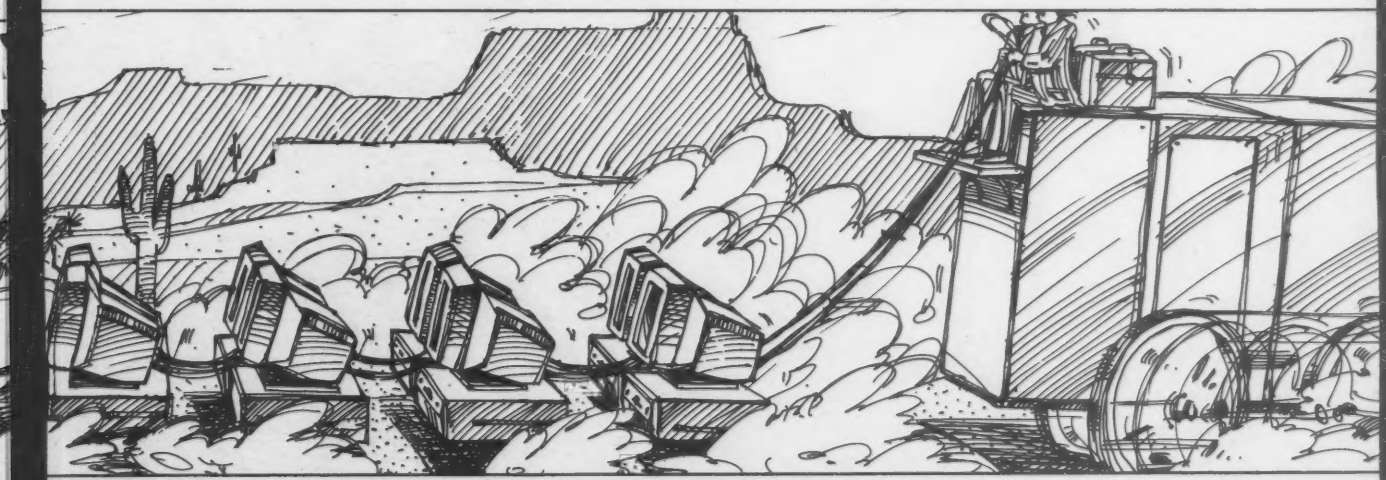
Despite the great deal of hype about Hypercard, there is much good to be said about its programming language, Hypertalk, which possesses many of the attributes of Smalltalk, which was originally developed by Xerox Corp., and object-oriented languages. Many of the developers of the latest products in Macintosh connectivity have turned the Hypercard environment into an excellent prototyping tool for working with their products. Such systems as MacAPPC, CL/1, Sequelink and Scotts Valley, Calif.-based Touch Communications, Inc.'s Touch OSI have shown the ease of prototyping with Hypercard. Given the proper connectivity libraries, those organizations now using Hypercard to create information and training stacks are sure to devote some effort to extending Hypercard to cooperative processing tasks. Customization could not get much easier.

Apple is letting its Macintosh computers do what they do best while linked to the mainframes and superminis that usually contain the data of greatest importance to corporations.

Apple has decided to become a major participant in connectivity and cooperative processing, letting its Macintosh computers do what they do best while linked to the mainframes and superminis that usually contain the data of greatest importance to corporations. The alliance between Apple and DEC may yield a networking system that could rival IBM's Systems Application Architecture (SAA).

On the other hand, Apple is not ignoring SAA and will become a participant in that architecture as the year progresses.

Once a company settles on a networking architecture, MIS can implement it with fewer problems than before regarding which desktop computers to use — Apple Macintoshes or IBM Personal Computers or Personal System/2s. At the same time, the user benefits because he can effectively get at corporate data with the system he finds to be most productive. ✧



N IS BETTER THAN MERE CONNECTION.

And without special hardware, it allows "hot-key" 3270 sessions into other host environments like CMS, TSO, and CICS as well as 3287 support for your Epson® or compatible printer.

A TIGHT REIN ON SYSTEM SECURITY

Yet Arbiter keeps the team under control. Its system administration facility lets central support personnel display the configuration, session activity, and resource consumption for each PC in the network as well as determine and correct problems. Popular security packages such as ACF2, RACF, and Top Secret are already interfaced into Arbiter so that your existing host security becomes Arbiter's.

ON—AND OVER—THE HORIZON

Arbiter is being used now at hundreds of PCs at Fortune 500 locations worldwide. It's a flexible, dynamic architecture that fully supports SNA and will support SAA as IBM defines the SNA-to-SAA interfaces, rules, and protocols for OS/2.

Get your team pulling together. Call (919) 481-4444 today for a no-cost, no-obligation demonstration of the power of Arbiter.

Arbiter. Because pulling together beats getting pulled apart.

TANGRAM SYSTEMS CORPORATION

PO Box 5069 Cary, NC 27511-1999 (919) 481 4444

©1988 Tangram Systems Corp. Arbiter is a registered trademark of Tangram. IBM is TM of IBM, Inc. Epson is TM of Epson America, Inc.

Circle Reader Service Number 16

© 1988 AT&T

"...but that would be a waste of money; our smaller locations don't require dedicated access lines...

Look, if we don't get dedicated lines, we can't get a quality public packet service.

That's ridiculous..."

Just because you don't have the kind of volume that warrants dedicated access lines doesn't mean you have to use a packet service that's less than perfect. At AT&T, we realize that no matter how much (or how little) information you send through a packet network, your business depends upon getting it there on time and accurately.

To make sure of that, we offer the quality, reliability and speed of AT&T ACCUNET® Packet Service through asynchronous dial-up access. Which means you receive the same high-quality transmission as if you were using our dedicated lines.

This service is called REDI-ACCESS,* a very cost-effective alternative to using dedicated lines for low-volume needs.

What's more, just recently, REDI-ACCESS was expanded to over 300 cities (up from 150). So, chances are, the call will be local—which reduces costs even more.

When transactions travel overseas, you can count on the same high quality and quick access. Because, you see, unlike most other packet services, we operate our own connections to packet networks in other countries.

For more information on how AT&T ACCUNET Packet Service and REDI-ACCESS can help your business, call your AT&T account executive or one of our sales representatives at 1 800 222-0400.

From equipment to networking, from computers to communications, AT&T is the right choice.

*REDI-ACCESS is a trademark of Control Data Corporation, co-marketed with AT&T ACCUNET Packet Service.

AT&T
The right choice.

Outgrown your 3270 software?

Is your terminal emulation software eating too much memory? Won't work as a LAN gateway? Makes you wait idly for file transfers?

Meet Attachmate EXTRA!

EXTRA! Connectivity Software™ is the most powerful micro-to-mainframe link you can buy.

EXTRA! lets you work while you transfer files. Lets you print mainframe data on your PC printer. Runs on coax, LANs and remote modems. Uses less than *half* the PC memory of its IBM® counterpart. Includes all the latest IBM Application Program Interfaces like HLLAPI and SRPI. And much more.

In short, *EXTRA!* has the industry's longest list of standard features. Plus options for stunning graphics and LAN gateways.

3270 emulation you won't outgrow.

At Attachmate, 3270 terminal emulation is all we do. So we keep all our products on the cutting edge.

Our all-new *Guide to Advanced 3270 Connectivity* gives you a detailed look at the field's latest developments. For your free copy and more information about *EXTRA!*, call toll-free: **1-800-426-6283.**

Attachmate

Quality Micro-Mainframe Solutions.

Attachmate Corporation, 3241-118th Avenue S.E., Bellevue, Washington 98005. In Washington, call (206) 644-4010. Sales offices in most major cities.

Copyright © 1988, Attachmate Corporation, EXTRA! Connectivity Software is a trademark of Attachmate Corporation. IBM is a registered trademark of International Business Machines Corporation.

Circle Reader Service Number 17

CORPORATE CLASH

CHUCK LABOUCEUR, TOM MONAHAN

The battle for network dominance

BY STAN KOLODZIEJ
SENIOR EDITOR

Its drama might not be as sweeping as a clash of armies, but the behind-the-scenes maneuvering of IBM and AT&T points to a future battle royal in networking between these two major corporations. The outcome could decide who gets the lion's share of U.S. corporate computing.

The scale of the conflict is changing significantly. Both IBM and AT&T have recently been busy with reorganizations, joint product development strategies and new product introductions that have raised the breadth of both companies' overall influence in corporate computing. All this movement has also opened the crack a bit, revealing to observers where corporate computing might now be headed.

First IBM. After what seemed a long pause between significant announcements, IBM made two moves recently that caught many industry watchers by surprise.

The first move, a large internal reorganization, created five new divisions and put IBM's official stamp on the increasingly important role telecommunications will play in the company's product and marketing strategy. The general managers in charge of these new divisions apparently have been given great freedom in developing the kinds of products they see fit for their own marketing purposes. The new IBM telecommunications division is no exception.

"Historically, communications products at IBM, which included Systems Network Architecture [SNA], data communications and Rolm Corp.'s voice systems, were under separate supervision," explains Dick Sullivan, IBM's director of telecommunications systems marketing. "By combining these elements and bringing them under one executive, we hope to accelerate voice and data integrated systems solutions."

Ellen Hancock, the executive in charge of the new telecom division and a career IBM staff member, has stated that IBM's Systems Application Architecture (SAA) will be given top priority in IBM's future communications strategy. SAA is the proposed set of IBM software architectures that will form a transparent bridge across IBM's main hardware systems, operating systems and programming languages. SAA is important because it will finally end the need for IBM to create awkward software layers between users and IBM's diverse system architectures. Although SAA is a major software push that will have repercussions across the other IBM divisions, the architecture has particular relevance for Hancock's communications concerns.

Two of the most important elements of SAA, creating single-user and single communications interfaces, are vital if IBM's communications strategy is to break free from that of other vendors, especially from main competitors Digital Equipment Corp. and AT&T. What SAA promises to do is help IBM get its internal communications house in order and shore up the difficulties in communicating across IBM systems, shortcomings that have been exploited effectively in the past by the homogeneity of DEC systems and now by AT&T and the resurgence of Unix.

Sullivan reacts, however, to the criticism that SAA is still predominantly a proprietary set of architectures that locks IBM customers into IBM systems.

"The communications interface in SAA is SNA, an architecture that includes a set of international communications standards such as CCITT X.25 and, eventually, ISDN [Integrated Services Digital Network]," Sullivan explains. "Most of our larger customers are global in nature, and they want international systems solutions. Our implementation of global standards is important to them as well as to IBM."

Sullivan presents SAA not as an end in itself but as another platform from which customers will eventually be able to plug into global communications via international standards and, by extension, IBM global networks.

IBM's entire emphasis suddenly — though the company argues that it has always been so — is toward adopting open standards. To drive the point home, IBM recently announced surprise No. 2: AIX, its forgotten Unix version, will now be available for its linchpin 370 system architecture. IBM has even intimated that Unix will play a big part in future IBM mainframe programming for IBM commercial systems customers.

At the same time, IBM reiterated its pledge of open systems and standards and berated any attempt to try and close Unix from the majority of the marketplace, a barb aimed at AT&T and its apparent reluctance to commit Unix's future solely to official Unix standards bodies such as Posix.

IBM's Unix announcement should not come as a complete surprise, however. C, one of the three programming languages supported within SAA, is an integral part of Unix programming and has become something of a celebrity in the

IBM, AT&T raise the networking stakes to a global level. Story page 37.

eyes of many programmers. IBM's latest Unix announcement highlighted the importance of IBM's inclusion of C in SAA a few years ago.

Perhaps as importantly, the Unix and C tie has also brought into focus the fact that IBM seems to be better now at combining elements of its overall strategy together than it perhaps has been in the past. IBM has had an annoying tendency of missing opportunities to bridge products together across diverse operating environments, a prime example being the initial lack of a working link between its Distributed Office Support System and Professional Office System office automation software. Lately, however, product announcements are fitting into a coherent scheme, and IBM's new divisional managers will most likely continue that trend.

IBM's embrace of Unix, however, is as much a marketing imperative aimed at blunting some of the sudden momentum AT&T has gained with Unix as it is an altruistic act on IBM's part to offer more standards options for its systems and communications. This observation is especially significant in light of AT&T's synergy with Sun Microsystems, Inc., whose impact on the marketplace goes beyond the high-powered engineering workstations the company produces.

IBM's SAA, which will be rife with open communications standards hooks such as ISDN and X.25, is still years away. In any case, such standards will be aimed, for the most part, at long-range voice and data communications.

This situation leaves a gap in terms of open standards at the local-area network, multiuser systems and mainframe levels, which AT&T is attempting to remedy with Unix. The battle for global network supremacy might be years away, but the struggle for strategically important local and enterprisewide networking is very much in the here and now.

Worry lines

AT&T's relationship with Sun has AT&T's competitors worried on several fronts. First of all, Sun's founders are well-versed in Unix development, with co-founder William Joy having been instrumental in shaping the influential University of California at Berkeley Unix versions. From a fairly obscure background, Berkeley Unix has ridden Sun's meteoric success into the forefront of Unix standards issues.

As Unix becomes more of a factor in commercial computing and communications, AT&T's competitors, such as Hewlett-Packard Co., DEC and IBM, have been maneuvering behind the scenes, making clear their concern that AT&T and Sun follow the dictates of the IEEE Posix standards committee in adhering to a truly open Unix standard.

What has competitors like IBM worried is AT&T's declaration that its Unix System V Release 4.0 will include important elements from Sun Microsystems' SunOS operating system and Berkeley Unix 4.2 and 4.3, both of which are closely associated with the principals at Sun. Furthermore, Release 4.0 is slated to take advantage of Sun's Scalable Processor Architecture (Sparc) chip, which is based on reduced instruction set computing (RISC) technology. Though other companies, including IBM, offer machines based on RISC technology, never has RISC been part of such a clear directional strategy in a vendor's networking goals (with the possible exception of HP).

In the words of Bill O'Shea, director of information technology development at AT&T, "We look at [Sun's] Sparc technology as the CPU engine for our next generation of mid-range machines — in other words, our future minicomputers and servers, those systems supporting up to several hundred users. Sun Microsystems will be providing the computing nodes on our network structure."

No beating around the bush

O'Shea's statement is unequivocal: AT&T's major decision to build networking around RISC and, more specifically, Sun's Sparc technology, and wrapping Unix around it is leading IBM and others to be naturally suspicious of AT&T's intentions to abide by its call for an open Unix, an operating system whose fate AT&T still controls to a large extent. The specter of powerful, low-cost network servers, based on innovative Sparc technology and driven by optimized Unix, is daunting enough for competitors in the engineering workstation market. The thought of this combination applied to the mainstream commercial market could cause ulcers.

IBM's Sullivan, however, reflects IBM's tactful approach to the sensitive standards issue. "If there's one thing that our customers are pressuring us for, it's the need for communications between IBM systems and between IBM systems and other vendors' systems. There are certain selected areas in our [system] architectures that IBM believes need to be opened. Our customers, and I'm sure other vendors' customers, want interoperability as soon as possible. If certain architectures are not left open, then it will have a negative impact on industry growth. Closing Unix is not in the right direction," he says.

AT&T's O'Shea, however, insists that his company's intentions for Unix are honorable. He says AT&T will come into compliance with Posix when Posix becomes a final standard.

To drive home his point, O'Shea lays

New Release!

SPF/PC™ 2.0

Brace yourself for the zero-learning-curve experience. **SPF/PC™ 2.0** brings full mainframe editing power to the PC environment: true split screen, directory lists, command stacking, picture strings, 43-line-EGA and 50-line-VGA support, binary file editing, the latest mainframe commands and much more.

Need proof? Call or write for a free demonstration diskette.

SPF/PC™, so much like the real thing, you'll forget you're editing on a PC.

CTC

Command Technology Corporation

1900 Mountain Blvd., Oakland, CA, 94611 (415) 339-3530 Telex: 509330

Circle Reader Service Number 18

Please Use This Card For Product Information

COMPUTERWORLD FOCUS

Reader Service Card
Issue: May 4/Expires: July 13, 1988

Name _____ Title _____
Company _____ Phone _____
Address _____
City _____ State _____ Zip _____

A. Please check the business/industry in which you work: (check one)

End Users
1 ☐ Manufacturer (other than computer)
2 ☐ Finance/Insurance/Real Estate
3 ☐ Medicine/Law/Education
4 ☐ Wholesale/Retail/Trade
5 ☐ Business Service (except DP)
6 ☐ Government - State/Federal/Local
7 ☐ Public Utility/Communication Systems/Transportation
8 ☐ Mining/Construction/Petroleum/Refining
9 ☐ Other User _____ (please specify)

Vendors
10 ☐ Manufacturer of Computers, Computer-Related Systems or Peripherals
11 ☐ Computer Service Bureau/Software/Planning/Consulting
12 ☐ Computer/Peripheral Dealer/Distributor/Retailer
13 ☐ Other Vendor _____ (please specify)

B. Please check your main job function: (check one)
1 ☐ Corporate Management
2 ☐ Financial Management
3 ☐ MIS/DP Management
4 ☐ MIS/DP Operations
5 ☐ Data Communications Management
6 ☐ Data Communications Operations

C. Reason for this inquiry: (check one)
1 ☐ Immediate purchase
2 ☐ Future purchase
3 ☐ Information only

D. Is this your personal copy of Computerworld Focus? (check one)
1 ☐ My personal copy
2 ☐ I'm a pass-along reader

E. Please check the number of employees in your company: (check one)
1 ☐ Over 1,000 employees
2 ☐ 501-1,000 employees
3 ☐ 500 or under

Circle the # that corresponds to the number at the bottom of the item in which you are interested.

1	21	41	61	81	101 121 141 161 181
2	22	42	62	82	102 122 142 162 182
3	23	43	63	83	103 123 143 163 183
4	24	44	64	84	104 124 144 164 184
5	25	45	65	85	105 125 145 165 185
6	26	46	66	86	106 126 146 166 186
7	27	47	67	87	107 127 147 167 187
8	28	48	68	88	108 128 148 168 188
9	29	49	69	89	109 129 149 169 189
10	30	50	70	90	110 130 150 170 190
11	31	51	71	91	111 131 151 171 191
12	32	52	72	92	112 132 152 172 192
13	33	53	73	93	113 133 153 173 193
14	34	54	74	94	114 134 154 174 194
15	35	55	75	95	115 135 155 175 195
16	36	56	76	96	116 136 156 176 196
17	37	57	77	97	117 137 157 177 197
18	38	58	78	98	118 138 158 178 198
19	39	59	79	99	119 139 159 179 199
20	40	60	80	100	120 140 160 180 200

☐ I have circled #200 on the Reader Service Card to enter my *Computerworld* subscription for one year, 51 weekly issues and 12 *Computerworld Focus* issues for $44 and please bill me later. This rate valid only in the U.S.

③

Please Fill Out This Card For Editorial Comments

COMPUTERWORLD FOCUS

READER COMMENTS

Name _____ Title _____
Company _____ Phone _____
City _____ State _____ Zip _____

1. Which articles or topics were most interesting to you in this issue? _____
2. What topics would you like to see covered in future issues? _____
3. What are your most important management problems? _____
4. What are your most important technical problems? _____
5. Are you responsible for recommending, specifying, and/or approving PC purchases? If so what are your 1988 PC buying plans?

PC Model	Quantity

6. What do you like most about Computerworld Focus? _____

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 124 DALTON, MA 01227

POSTAGE WILL BE PAID BY ADDRESSEE

Computerworld Focus

Post Office Box 300
Dalton, MA 01227-9882

Place
Stamp
Here

Attn: Ann Dooley
Computerworld Focus
375 Cochituate Road
Framingham, MA 01701-9171

out AT&T's three-pronged agenda: to continue to support its Unix System V Interface Definition; to make modifications to System V to allow it to be compatible with the Posix standard; and, beyond Posix, to incorporate a few other key Berkeley Unix features that he says Sun has pointed out to AT&T. When asked to be more specific about the latter point, O'Shea replies that the Berkeley elements in discussion with Sun Microsystems concern "suboptions of suboptions, down to the basic levels. Not the big issues."

Even with the apparent momentum AT&T has been getting behind Unix, the company still might not carry as much weight if it had not been for the recent restructuring at AT&T that placed Vittorio Cassoni, erstwhile Ing. C. Olivetti & Co. mover and shaker, at the head of a newly independent and apparently robust Data Systems Division (DSD). Cassoni's placement and AT&T's underwriting of a dedicated marketing and product development team at DSD has been hailed as a positive move for AT&T by industry observers and a presage of its possible surge in the computer market.

Also significant is the keen awareness Cassoni seems to have of merging current and future computer products with networking features.

Perhaps more importantly, Cassoni has shown from his days at Olivetti the importance of marketing in getting a product across.

This belief is apparent in his comments on how AT&T will market its recently introduced 6386 Workgroup System, a multiuser system based on Intel Corp.'s 80386 microprocessor. Historically, multiuser systems and LANs have been marketed separately by separate vendors, but both products have come into more direct competition with each other, chasing the same departmental, vertical markets.

To date, AT&T's multiuser systems have not sold briskly, and the fact that AT&T also actively markets its own LANs might, on the surface, seem a poor marketing move, a duplication of effort. Not according to Cassoni.

"Apart from a few exceptions, there is not a customer that has nothing, no computer systems, already installed," Cassoni explains. "The 6386 system runs Microsoft Corp. MS-DOS, IBM OS/2 and Unix System V independent of one another.

"On top of that, the 6386 gives IBM SQL [relational data base management] and, on the network side, a full sweep of SNA support from IBM LU6.2 to 3270 emulation, TCP/IP [Transmission Control Protocol/Internet Protocol] and X.25. So, the 6386 can manage a personal computer LAN but also [handle], in the same Intel 80386 system, a number of workstations in a typical minicomputer environment so that you're able to consolidate the old environment with the new LAN-based environment, which most customers are driving toward. The ability to combine a multiuser sort of functionality with the typical MS-DOS OS/2 LAN kind of approach is helpful."

Cassoni

Cassoni adds that one of the keys to the 6386 and future AT&T systems is the Application Operating Environment (AOE), a set of software services based on Unix System V and containing fourth-generation language software development facilities. Cassoni describes AOE as being closer to DEC's kind of cohesive operating environment across all systems than to IBM's multilayered SAA.

"The important thing is that this environment is stable across all our product lines," Cassoni says. "You have exactly the same application operating environment on a 386-based machine that you have in our [Unix-based] 3B minicomputer line."

Importantly, for future networking applications, Cassoni has made sure that AOE will be migrated to Sun's RISC-based machines.

O'Shea says he believes AT&T's emphasis on networking at the local level will pay dividends later as AT&T tries to provide all the elements of the strategically important concept of enterprisewide networks. These networks will form the backbone layer of corporate data and voice communications between LANs and sub-LANs and in global communications.

"We want to focus on work groups with multiuser systems and then leverage our networking integration strategies against those work groups," O'Shea explains. "The LAN we're going to base our leveraging on is AT&T Starlan. In those network configurations, we see the 6386 as a desktop machine for power users, but for other users, we're really going to be pushing it as a network server. Starlan is going to be the mechanism."

Getting networks up to speed

To help that vision along, Cassoni announced that AT&T will soon introduce a 10M bit/sec. Starlan, a version whose rate is 10 times the current base Starlan speed. Though O'Shea downplays the emphasis on speed in today's LANs, 10M bit/sec. is fast becoming the standard in many network applications and in the market perception of what a vendor should carry.

"Network media is not the problem, it's getting good work group software to take advantage of the media," O'Shea says. "That's where open Unix is going to be another big leverage for us."

Some are not so sure. Howard Gilbert, a systems programmer at the Yale University Computer Center in New Haven, Conn., says IBM's Token-Ring LAN has big networking advantages in being "almost indestructible and easy to diagnose. You can't say either about Ethernet." As for Starlan, Gilbert says it simply hasn't made an impact and probably still won't, even at 10M bit/sec.

"It's not the media, it's the software that's going to be the big networking issue, and I don't think AT&T is going to cut it," Gilbert says. "In fact, I don't think AT&T will be IBM's biggest competitor in the future. I think Microsoft might have that honor."

The big battle between AT&T and IBM, Gilbert suggests, could be overshadowed by an even bigger conflict.

"I think the big battle in the future will be the one between micros and mainframes controlling networks. Microsoft is trying to make OS/2 the optimum architecture for PCs to replace mainframes, while IBM is optimizing OS/2 to enable PCs to talk to mainframes and retain mainframes as the big component in future computing and communications." ❖

AT&T, IBM attempt to give you the world

BOTH IBM AND AT&T are slowly pushing the network stakes into the global marketplace.

Many analysts say they believe it is only a matter of time before IBM's current marketing and product development relationship with Network Equipment Technologies, Inc. (NET), a Redwood City, Calif., maker of T1 multiplexers, becomes a deeper equity partnership. Through NET, IBM is entering the hot T1 market with products that it could soon channel into spin-off services from its own global corporate network composed of satellites and private leased lines.

IBM, in fact, is already selling space to companies on the network, and some observers say the company could accelerate that service in the face of increasing telecommunications competition from AT&T and computer companies Digital Equipment Corp. and Unisys Corp., which are also beginning to eye such global services.

Dick Sullivan, IBM's director of Telecommunications Systems Marketing, even sees District Judge Harold Greene's most recent judgment in favor of the regional Bell holding companies as a business boost for IBM. In that decision, Greene opened the way for the regional companies to provide some computerized information services such as electronic mail and voice storage and retrieval.

"We look at the ruling as an opportunity for the telephone companies [to be] gateway providers. It gives us [IBM] the opportunity to sell messaging applications, electronic mail applications and other solutions to these telephone companies and, ultimately, to end users, using the telephone companies as gateways," Sullivan explains.

"There are areas where we'll be competing directly with the telephone companies," he adds, "but there are also areas where we are customers of theirs and vice versa."

Both IBM and AT&T are working extensively in fiber-optic technology, with AT&T apparently making strides in improving its long-haul private network offerings. A step in that direction is TAT-8, AT&T's fiber-optic cable that will link Europe and North America.

As for IBM, Sullivan says that it is just a matter of time before the company's fiber-optic research, which he says IBM uses extensively for its own internal purposes, will be channeled into the private sector.

Both AT&T and IBM have also recently made some firsts in telecommunications.

AT&T has purchased its first satellite communications company, Atlanta-based Tridom Corp., while IBM replied with the acquisition of Pactel Spectrum Services, a division of the Pacific Telesis Group and the first major corporate purchase since its buyout of Rolm Corp. some years back.

Spectrum promises to extend IBM's important network management capabilities beyond its backbone Systems Network Architecture network into larger data and voice networks.

AT&T has raised the stakes considerably, however, with its recent announcement of Integrated Services Digital Network (ISDN) services. ISDN is important because it represents a worldwide attempt to upgrade international phone and data communications networks through official standards. One of the two ISDN services that AT&T plans on having in place across the U.S. next year, pending Federal Communications Commission approval, will enable AT&T clients leasing digital communications lines to automatically switch to a less contested channel to increase efficiency and cut line costs.

AT&T is also expected to introduce more extensive ISDN data communications services sometime during the latter half of this year. Though ISDN is based on international standards open to all companies, AT&T no doubt will be in an influential position to control much of the future marketing direction of ISDN and, therefore, much of global communications through its early pull on ISDN third-party hardware and component makers.

The big communications puzzle might be slowly coming together. — STAN KOLODZIEJ

© Eastman Kodak Company, 1988

The Kodak Komstar imaging system is living, growing proof of Kodak's commitment to computer output. It's a product for today and tomorrow.

The Komstar system is just what you'd expect from the leader in dry laser on-line installed COM systems. And living proof of Kodak's commitment to COM. It's a complete, integrated system for managing documents that uses laser technology to print your mainframe output on film, process it without chemicals, duplicate it, collate it, and now even create distribution labels for maximum throughput. With minimal operator intervention. And, as always, the best reliability in the COM industry, plus Kodak service and support to keep it that way. Talk to your Kodak Business Imaging Systems representative about the Komstar system, or call 1 800 445-6325, Ext. 300.

KODAK KOMSTAR
Imaging System

COMPUTER OUTPUT YOU CAN COUNT ON.

KODAK

The new vision of Kodak

Kodak

Circle Reader Service Number 19

Converging at a data center near you

Firms unite voice, data and imaging

BY HELEN PIKE

Imagine a telephone system used by 1.3 million employees in 3,500 locations, averaging 1.5 billion call minutes per year through 1,655 private branch exchanges. This is the Federal Telecommunications System (FTS), the largest telephone network in the world. But its users don't transmit information by voice alone anymore. They are facing an ever-growing backlog of data that some day could make the Library of Congress look like a manual for plugging in 3Com Corp.'s 3stations, so Uncle Sam wants to upgrade the 25-year-old system.

The engineering plan calls for nothing less than integrating voice with data and the emerging use of imaging and to transmit all that information back and forth on the same cable. The contract is referred to as the FTS 2000 because its intent is to take care of the federal government's communications needs into the 21st century.

"The FTS was a leading system in the 1960s when it was first designed," said Bernard J. Bennington, the General Services Administration's (GSA) deputy commissioner for telecommunications services, in a 1985 interview. "We want the FTS 2000 to put us back into the leadership role."

But that is Washington, D.C. Outside the nation's capitol, far away from antitrust policies and charges of government impropriety (see story page 42) and far away from the spirit of public service, the private sector is racing ahead of the federal government to unite voice, data and imaging.

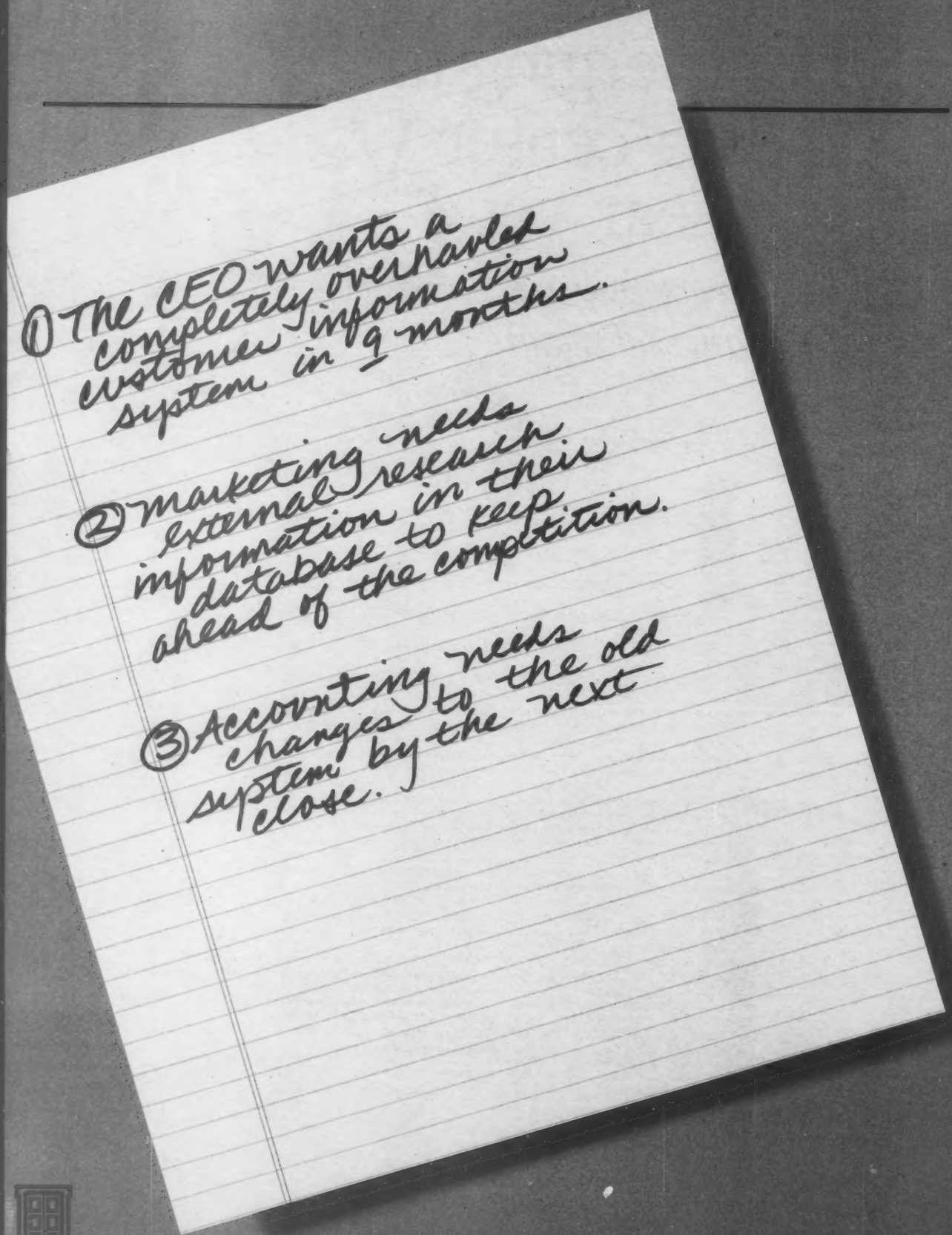
"If we can't have pie in the sky, we'll have cake on the table," is how Michael Dortch, an independent consultant, characterizes emerging uses of the FTS 2000's technical proposal. Dortch, who works in San Francisco, has analyzed the telecommunications industry for about 10 years, listing AT&T, U.S. Sprint Communications Co., MCI Communications Corp. and the regional Bell holding companies as some of the clients for whom he has done research.

Cost-conscious MIS and telecommunications managers have budgets to maintain and personnel numbers to keep low, Dortch observes. These managers "have no idea when [the FTS 2000 technology] will come, but they are under pressure to design more efficient networks now. They will save the Buck Rogers stuff for later."

As Dortch continues, he points out

Pike is *Computerworld Focus*'s senior writer.

How Would You Deal With These Problems?



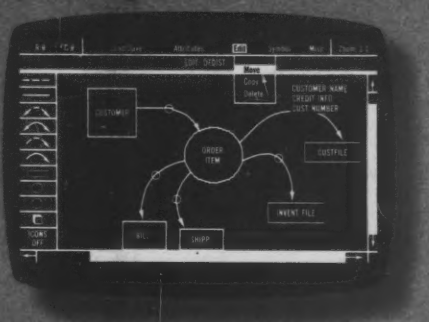
Start with a strong FOUNDATION.™ Introducing the Integrated Software Solution for System Development Problems.

FOUNDATION is a full life cycle CASE environment for planning, designing, installing and maintaining systems faster than you've ever anticipated.

FOUNDATION provides the integrated components to tackle large and small system development projects more quickly, more efficiently and with better quality results than you thought possible. Integration virtually eliminates the standard snafus of single function tools. Redundancies. Incompatible functions. Multiple languages.

METHOD/1™ for planning.
METHOD/1 provides an *automated* system for project estimating, work planning, project control and management change control. This established life cycle methodology has been used to deliver thousands of successful applications.

DESIGN/1™ for system design.
DESIGN/1 is a dictionary-based system for analysts and designers to develop data flow diagrams, paint screens and reports, plus facilitate data design and maintenance. To facilitate better system design, the prototyping facility encourages user participation.



INSTALL/1™ for code generation and maintenance.
INSTALL/1 uses the design specifications from DESIGN/1 and generates a production COBOL program. It promotes standardization during the development process by generating everything necessary for an on-line application: records, screens, SQL, logic and copybooks. Configuration management and testing aids complete the system. When maintenance is required, changes are resolved throughout the system automatically.

At the heart of FOUNDATION is a central repository containing an *active data dictionary* that ties the components together. The dictionary is built on DB2™ to exploit its powerful relational capabilities along with the advantages of MVS/XA, CICS, and COBOL II.

FOUNDATION comes with something no other CASE tool or environment can offer. The experience of Arthur Andersen & Co. Experience that comes from more than 35 years of developing systems solutions for our clients. Plus, FOUNDATION is supported by an experienced technical team that can be made available to service your special needs.

To learn how FOUNDATION can help solve your systems development problems call:

1-312-507-5161

FOUNDATION™

ARTHUR ANDERSEN & CO.

© 1988, Arthur Andersen & Co.

Circle Reader Service Number 20

DB2 is a trademark of International Business Machines Corporation

that the telecommunications industry has been trying for years to get diverse traffic pumped down one line, and the only way to do that is with digital signals. Dortch is wary about the claims of the Integrated Services Digital Network (ISDN). In his estimation, ISDN is nothing more than a way for telephone carriers to justify their accelerated investment in new switching and transmission equipment.

ISDN downplayed

"They want to pump as much data down their lines as possible, and that requires digital lines. ISDN is nothing more than a transmission medium," Dortch says.

On the other hand, "FTS 2000 is a telecommunications management strategy," he says about the federal contract's practical value to information managers.

Telecom vendors know a lot about data because they have been helping users push data down voice pipes for years, according to Dortch. "Politically, MIS directors in user companies should make friends with their counterparts on the voice side of the house, because right now, MIS often hasn't the foggiest clue about how voice works."

Video, frequently grouped under the label of imaging, will eventually be integrated with voice and data, he says, but it will need a lot of power and memory. It may be useful for product modeling and for engineering designs, he explains, but for text-based electronic mail, facsimile machines will be cheaper than building videoconference centers.

On another level, FTS 2000 is also a form of market validation that will help the carriers sell ISDN capability in the private arena, Dortch says.

Dortch likens the GSA's futuristic phone plan to a user-as-reseller strategy in which the GSA would resell its telecommunications services to other government agencies and departments. The Boston-based Yankee Group, a market-research concern, calls this the "BYOB," or Be Your Own Bell, strategy. And Dortch notes it is gaining popularity among large users.

Large organizations are typically the early adopters of technology. In the case of building a Bell system, customers can work with AT&T to implement Tariff 12, also known as the Virtual Telecommunications Network Service.

Custom networks

Tariff 12 allows AT&T to create custom networks for voice and data using a flexible mix of services under long-term contract at packaged rates. In exchange for providing this service, AT&T is taxed with a tariff by the government. Among the customers who have lined up so far to use Tariff 12 are Du Pont Co. and General Electric Co.

"We might add video, but the

FTS 2000 generates more controversy than kudos

"MANY OFFICIALS in the government... appear to be comfortable with processing information the same ways they have been doing it for the last 20 years. This is not what I would call an innovative, forward-thinking position — nor does it serve the best interest of the taxpayers."

Rep. Jack Brooks (D-Texas)

The federal government's contract to upgrade its 25-year-old telephone system has made a lot of headlines — and not for the reasons originally hoped. Government officials had expected the contract's technical prospectus to receive front-page coverage crediting Uncle Sam with taking a visible leadership role in promoting low-cost integration and transmission. Instead, news accounts on the Federal Telecommunications System (FTS) 2000 have unraveled stories swirling more with politics and alleged government impropriety than with the integration of voice, data and imaging — the three key information technologies.

The plan for the world's largest telephone system, private or public, calls for the integration of voice mail, high-speed data transfer and full-motion teleconferencing video services for sending over a single transmission medium or a combination of media. The conduits could be either copper wires or fiber-optic cables, microwaves or satellites. The services include controlled service access, encryption and mass calling. A clause in the contract also calls for a continuously upgradable design so that new features can be accommodated at the lowest cost.

"We're making the telecommunications industry rethink itself. It's a legacy we leave to all the other users," says Bernard J. Bennington, deputy commissioner for telecommunications services at the General Services Administration (GSA).

The contract underscores an emphasis on data transmission over voice communications as federal surveys point to a 6% annual rate of decline in the use of voice traffic by the government. Government projections show that by 1990, data communications will make up 50% of all transmissions while voice will make up about 42%.

Then there is the advent of teleconferencing. "Digital technology makes video available," Bennington says. Using one of his oft-cited examples, Bennington says the Veterans Administration would take advantage of video as a means to link its hospitals together. Teleconferencing is an alternative to travel in which, for example, doctors could observe each other in operations, he explains.

Teleconferencing also is one of the future capabilities that will be made easier with the advent of Integrated Services Digital Network (ISDN), the information transmission service under development by the regional Bell holding companies and a service that the federal government says it would like to implement as part of its FTS 2000 modernization.

"We've got two forces going here. This is a push-pull market," Bennington says about the FTS 2000's far-reaching intent. "The government has pushed the companies to state what they will provide in the next 10 years, and we [the government] will buy it."

Integrating voice, data and imaging isn't the only goal of the FTS 2000. A second one is to wring excess out of the federal phone bill — as much as $100 million annually, according to Bennington. The FTS system in place today delivers approximately 1.5 billion call minutes per year in long-distance traffic; in 1985, for example, the federal government paid $424 million for long-distance calls; in 1987, that figure rose to $462 million.

But the news of these goals in recent months has been overshadowed by headlines about alleged government wrongdoings and Washington's continued free-market sentiments that are driving the telecom industry.

As of this writing, the contract awards for upgrading to digital the analog switches used to route telephone calls are in dispute. AT&T alleges that a GSA employee leaked its proprietary information to competitors, and there are countercharges that AT&T itself may have received confidential data by the same means.

A GSA employee has been charged with leaking information from sealed bids dealing with upgrading the switches. Speculation centers on the possibility that the employee was fanning a price war in order to lower the federal government's overall telephone costs.

But the digital switches, as 12 separate contracts valued at $55 million, are only a part of the total FTS 2000 specification.

As initially drawn up, the FTS 2000 proposal called for the switches as well as transmission circuits, a control system and data bases all to be awarded to a single company over a 10-year period. (The first FTS contract for telephones only had gone to AT&T in February 1963.) The administration estimates the value of the new contract at $4.2 billion.

After the specifications were made public, the contract made headlines. But not for the forward-thinking design. This time, Rep. Brooks, chairman of the Government Operations Committee and a champion of competition in federal contracts, leaned on the GSA to break apart the FTS 2000 contract and make various sections competitive, awarding bids to different companies, not just one. Furthermore, Brooks estimated the FTS 2000's total value at closer to $25 billion with the addition of data and video applications to the voice communications load.

Bowing to pressure, the GSA decided to follow similar methods used by other government agencies, such as the Department of Defense, in awarding contracts to teams of commercial companies. It divided the FTS 2000 plan into two separate phone systems to be maintained by two separate groups of vendors. In some cities, both networks will serve federal employees. In other cities, there will only be one network.

AT&T and Boeing Computer Services Co. make up one of the two leading teams. The other group consists of Martin Marietta Corp. with MCI Communications Corp., the seven regional Bell holding companies and Northern Telecom, Inc. For undisclosed reasons, U.S. Sprint Communications Co. broke with partner Electronic Data Systems Corp. (EDS), a General Motors Corp. subsidiary, and is expected to be part of a new bidding team with parent company GTE Corp.

The deadline for bids on the rest of the FTS 2000 components has been most recently extended from March 31 to April 29. Awarding of the contract to the winning team is still set for September. A year later than initially scheduled. One year away from the original implementation date. Seven years after the GSA started thinking and planning how to upgrade its aging analog system. — HELEN PIKE

need is not that pervasive," comments Stanley M. Welland, corporate telecommunications manager for GE, which has 100,000 users on the corporate network.

While there is not a great demand for it at the corporate level, Welland does acknowledge there is a use for full-motion or compressed video among engineers and scientists whose work is design-intensive. Such a technology would also save a lot of travel, he adds.

At the very least, all companies should be looking at simultaneous voice and data transmission, he says. "Anyone who's not looking at it is leaving money on the table."

Picking up requests for help in integrating voice, data and imaging is Electronic Data Systems Corp. (EDS), which integrated voice, data and imaging for the company that acquired it, General Motors Corp. EDS now sells that capability out of house.

"You have the choice to do it yourself or the choice to hire someone like EDS to do it for you," says Harmut W. Burger, manager for the last four years of the network engineering group at EDS in Southfield, Mich.

The integration for GM took place because data had become much more strategically important than voice for the company, according to Burger, who had previously managed GM's MIS needs for 24 years. GM started looking into the future in the early 1980s when it saw it had to integrate its manufacturing, ordering and delivery operations in order to remain globally competitive.

GM needed help

"General Motors had to be much more responsive to the market environment," Burger explains. "[It] had to shorten its product development cycles, to shorten the delivery cycles. It became obvious that communications, especially data communications, was going to be of extremely strategic importance for that integration process."

The company invested roughly $500 million in creating a digital infrastructure with switched digital circuits from such vendors as AT&T, MCI and U.S. Sprint — all selected based on economics, according to Burger.

"We are only in the business of building networks in order to meet customer requirements," Burger explains, saying EDS's clients are located at 70,000 sites in 25 countries. In 1984, EDS bought 500 PBXs — to gain control over the networks, according to Burger — and the switches had to be digital and migratable to the ISDN environment. "We are not vendor dependent. We pick whatever vendor best meets our customer requirements. Therefore, we mix and match all kinds of vendors and keep competition alive.

"Right now, the major challenge in our particular environment is to get control over the diversified technologies and the mix-and-match vendor environment," he continues. The EDS network is made up of 300,000 phones, 250,000 data terminals and hundreds of large-scale computers and front-end processors.

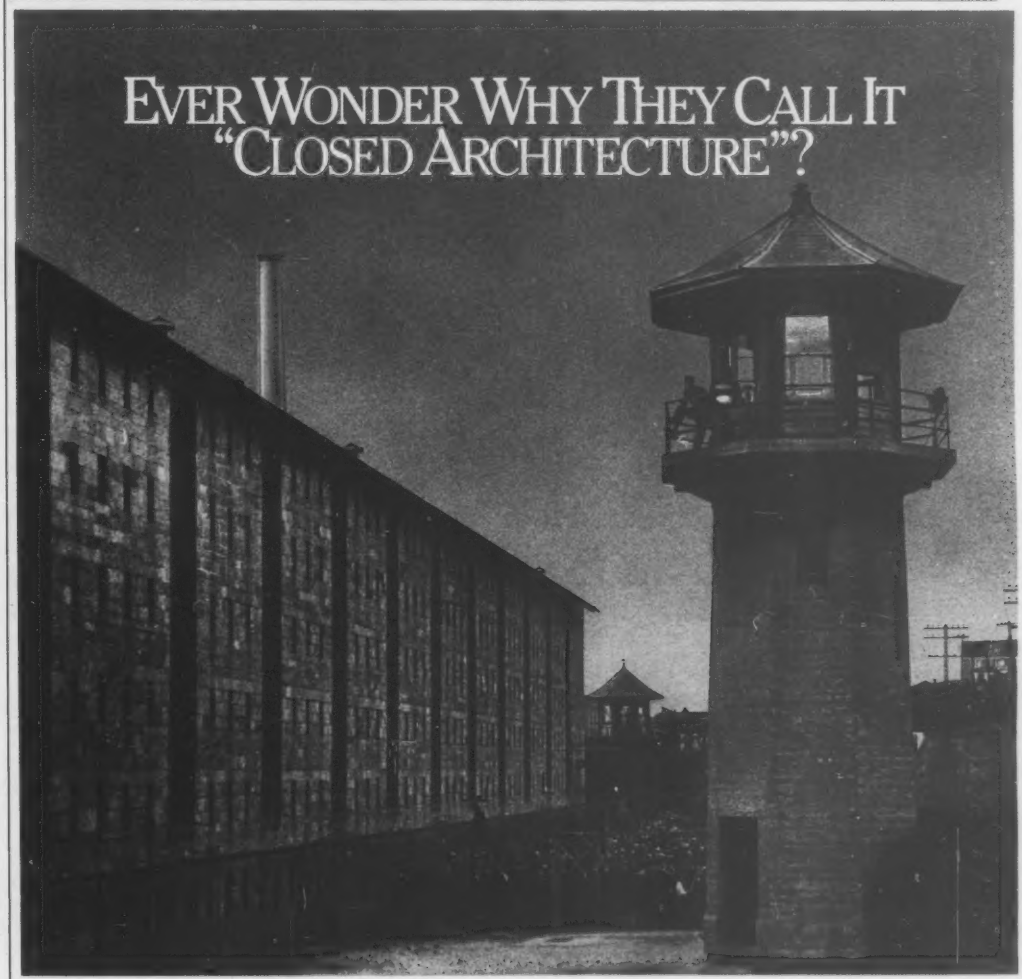
"Network management is the biggest hot button that we have at this point in time," Burger says.

MIS's challenge

According to Burger, MIS has to realize that the challenge no longer lies in making data centers operational. Rather, it lies in interconnecting data centers and voice users, he says, adding that this information can have any form, be it voice, data or video.

"We are heavily in the video environment," Burger says. At EDS, that means roughly 2,000 receive-only video-oriented microwave earth stations. Major hubs are co-located with the company's information processing terminals, he says, from which EDS can up-link broadcast information throughout the country. In addition, there is a mobile up-link truck that is dispatched to any location from which EDS wants to start a broadcast.

In the convergence of data, voice and imaging, "the issue is to bring the information to the end user of the information,"

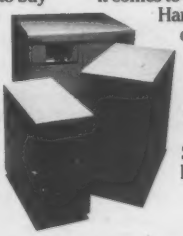


THE HARRIS HCX SERIES GUARANTEES YOU WON'T BE LOCKED IN FOR LIFE.

Closed architecture is a crime. One you end up paying for, in inflated prices when you need to buy additional systems. In the end, the man-years of software development and training you invest in a proprietary system lock you in.

The Harris HCX series of high performance, UNIX®-based super-minicomputers, on the other hand, is designed with an open architecture. So when you buy Harris, you buy freedom. Not a ball and chain.

Open architecture means we adhere to standards. We support AT&T and Berkeley UNIX, as well as standard communications. But when it comes to performance, we exceed all standards.



Harris is a $2 billion company with 18 years of experience in high performance computers, and more than 140 customer support offices in the U.S. alone.

So don't be sentenced to life with an inflexible system. Choose Harris.

Write Ron Baker, Harris Computer Systems, 2101 West Cypress Creek Road, Ft. Lauderdale, FL 33309.

Or call 1-800-4-HARRIS, ext. 4041.

HIGH PERFORMANCE COMPUTER SYSTEMS FOR THE WORLD'S MOST DEMANDING USERS.

HARRIS

UNIX is a registered trademark of AT&T.

Circle Reader Service Number 21

Burger says.

EDS is not the only early adopter of technology trying to meet an internal, corporate need for sending integrated information. For the last 10 years, Robert S. Dines, IBM's U.S. internal telecommunications director, has been bringing his work closer together with that of Big Blue's internal MIS department.

"The most dramatic changes have taken place in the last 10 years," he notes.

Today, IBM has a global network to offices in 145 countries through a combination of satellites and fiber optics. In the U.S., Dines estimates voice takes up 55% of the communications load, while data takes up 35% and video 10%. IBM's own users in this country add up to 275,000 for voice and 300,000 for data.

"Our plan is to integrate these for high-speed transmission," Dines says about the possibility of coming down from satellites and using T1 or T3 multiplexers or fiber-optic networks. "But we have to choose the right technology so we don't have any false starts."

Video is used internally by IBM in two different ways. Sales and marketing personnel can hold meetings in any of 150 two-way teleconference centers located around the world. For education seminars, there are 15 one-way conference sites that have sound as well as a video delivery capability in half-a-minute slow scan for color. There are plans for 10 more centers by year's end. In addition, IBM, like EDS, uses facsimile for rapid transmission of documents that are not, in Dines' words, "in machine form.

"What we do is provide the best facilities for ourselves so we can be more competitive," he says, explaining IBM's internal viewpoint. There is no notion of providing these facilities as a means of measuring IBM against its competitors, he adds.

"Our users are very creative in how they want to use their networks," Dines says. One of his examples is of the service department's choice of linking terminals into a data base to keep track of equipment and parts for more efficient maintenance.

"The new technology is more reliable," Dines observes. "It's a lot of fun integrating new technology in a way that's breaking new ground."

As competition escalates, prices will become elastic; the economics during the next five years should make network integration more attractive.

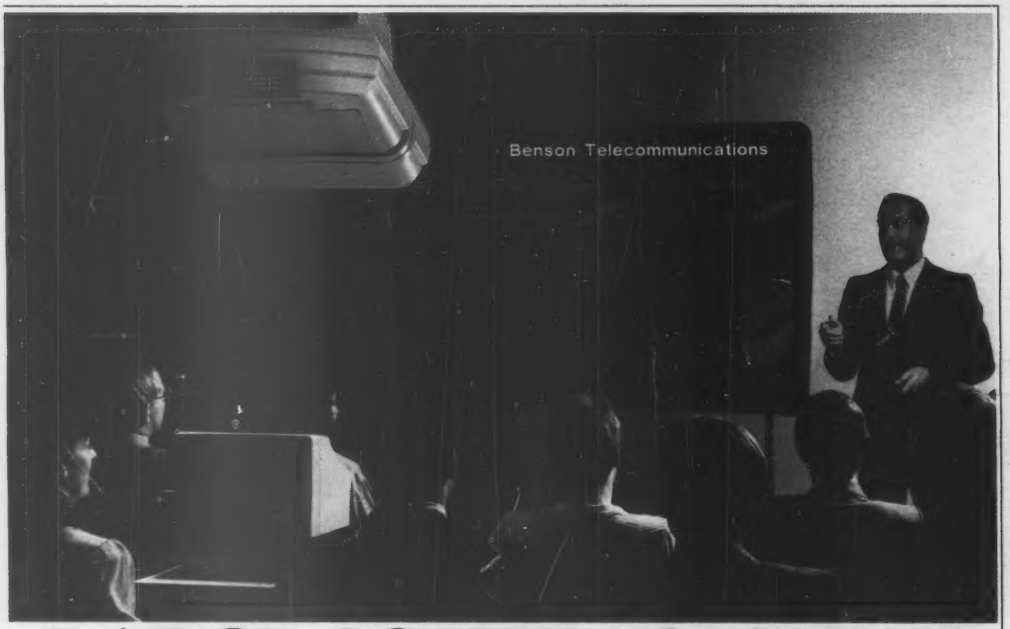
BRICE CLARK
HEWLETT-PACKARD CO.

But to break that new ground of implementing integrated information, will orders come from the top down or from the bottom up?

Brice Clark, an electrical engineer who has done research in microwave technology for Hewlett-Packard Co., sees a split between top down and bottom up in the adoption of communications technology. At one end of a network are the front-office needs that are phone-intensive and, therefore, more complex to integrate. At the other end is the factory floor, where manufacturing users find data and video a more appropriate means to send and receive information.

However, as competition escalates, prices will become elastic; the economics during the next five years should make network integration more attractive, says Clark, now computer-integrated manufacturing solutions manager within HP's Information Networks Group in Roseville, Calif.

The integration of voice and data will benefit from applications that take advantage of both, he adds. There are a few technologies that will provide standards and higher bandwidths, and that, Clark believes, "is what's truly going to be needed to integrate voice and data." ❖



LARGE SCREEN DISPLAY SOLUTIONS

Whenever two or more people get together to examine computer data/graphics, a real-time, large screen projection system is an invaluable tool.

Electrohome pioneered the concept of computer projection and, today, offers the most complete line of advanced systems. In the forefront are the new ECP® GRAPHICS single lens and ECP 3000 three lens systems. Both feature an advanced microprocessor that simplifies operation, and widens the capabilities gap between Electrohome and other projection systems.

Computer Intelligence makes the difference

This powerful microprocessor directs and monitors the main functions of the projection systems. Infrared remote control, help menus, frequency auto lock, diagnostics, digital convergence and memory are the prime benefits. "Plug-in module architecture" allows for the use of a variety of optional modules – extending functionality and hardware updating.

The ECP Graphics

This new single lens system can project images generated by high resolution (1024 × 1280 pixels, non-interlaced) CAD/CAM terminals, as well as video. Because it automatically locks on scan rates from 15-80 KHz, it's perfect for use with VCRs, PCs, terminals or high res CAD/CAM work stations. The ECP GRAPHICS is extremely portable and has VARI-FOCUS for screens 5' to 14' diagonal (front, rear or curved).

The ECP 3000

This new 3-lens system offers a bright, crisp image for screen sizes from 5'to 25' diagonal (front, rear or curved) and VARI-SCAN from 15-50 KHz. Like the ECP GRAPHICS this unit has a multi-function infrared remote control that includes digital convergence and all projector functions.

Large Screen Solutions for every application

Sales and Service in 40 Countries Worldwide. For more information on Electrohome color and monochrome projection systems, send your business card to

Electrohome Limited,
P.O. Box 628, Buffalo, NY 14225-0628.
In the U.S.A. call 1-800-265-2171.
In Canada call 1-519-744-7111.

ECP® is a registered trademark of Electrohome Limited.

Screen image courtesy of SAS Institute Inc.

ELECTROHOME
EYE-OPENING LARGE SCREEN PRESENTATIONS

SEE US AT AFCEA BOOTH #216

Circle Reader Service Number 22

Reading someone else's copy of Computerworld?

Get your own — You deserve it!

YES! I want my own subscription to COMPUTERWORLD. I'll pay just $44 for 51 weekly issues — that's only 86¢ per copy. In addition, I'll receive 12 FREE issues of COMPUTERWORLD FOCUS.

FIRST NAME M.I. LAST NAME

TITLE

COMPANY

ADDRESS

CITY STATE ZIP

Address shown: ☐ Home ☐ Business

For faster service call 1-800-255-6286! In NJ call 1-800-322-6286.

Canada, Central America & South America $110/Europe $165. All other countries $245 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. BUSINESS/INDUSTRY (Circle one)
   - **10.** Manufacturer (other than computer)
   - **20.** Finance/Insurance/Real Estate
   - **30.** Medicine/Law/Education
   - **40.** Wholesale/Retail/Trade
   - **50.** Business Service (except DP)
   - **60.** Government — State/Federal/Local
   - **65.** Communications Systems/Public Utilities/ Transportation
   - **70.** Mining/Construction/Petroleum/Refining/Agric.
   - **80.** Manufacturer of Computers, Computer-Related Systems or Peripherals
   - **85.** Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   - **90.** Computer/Peripheral Dealer/Distributor/Retailer
   - **75.** User: Other _____
   - **95.** Vendor: Other _____ (Please specify)
2. TITLE/FUNCTION (Circle one)
   - **IS/MIS/DP MANAGEMENT**
   - **19.** Vice President, Asst. VP
   - **21.** Dir., Mgr., Suprv., IS/MIS/DP Services
   - **22.** Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   - **23.** Dir., Mgr., Suprv., Analyst, of Systems
   - **31.** Dir., Mgr., Suprv., of Programming
   - **32.** Programmer, Methods Analyst
   - **35.** Dir., Mgr., Suprv., OA/WP
   - **38.** Data Comm. Network/Systems Mgt.
   - **OTHER COMPANY MANAGEMENT**
   - **11.** President, Owner/Partner, General Mgr.
   - **12.** Vice President/Asst. VP
   - **13.** Treasurer, Controller, Financial Officer
   - **41.** Engineering, Scientific, R&D, Tech. Mgt.
   - **51.** Sales/Mktg. Mgt.
   - **OTHER PROFESSIONALS**
   - **60.** Consulting Mgt.
   - **70.** Medical, Legal, Accounting Mgt.
   - **80.** Educators, Journalists, Librarians, Students
   - **90.** Others _____ (Please specify)
3. COMPUTER INVOLVEMENT (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant.
   - **A.** Mainframes/Supermins
   - **B.** Minicomputers/Small Business Computers
   - **C.** Microcomputers/Desktops
   - **D.** Communications Systems
   - **E.** Office Automation Systems
   - **F.** No Computer Involvement

340558-6

Reading someone else's copy of Computerworld?

Get your own — You deserve it!

YES! I want my own subscription to COMPUTERWORLD. I'll pay just $44 for 51 weekly issues — that's only 86¢ per copy. In addition, I'll receive 12 FREE issues of COMPUTERWORLD FOCUS.

FIRST NAME M.I. LAST NAME

TITLE

COMPANY

ADDRESS

CITY STATE ZIP

Address shown: ☐ Home ☐ Business

For faster service call 1-800-255-6286! In NJ call 1-800-322-6286.

Canada, Central America & South America $110/Europe $165. All other countries $245 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. BUSINESS/INDUSTRY (Circle one)
   - 10. Manufacturer (other than computer)
   - 20. Finance/Insurance/Real Estate
   - 30. Medicine/Law/Education
   - 40. Wholesale/Retail/Trade
   - 50. Business Service (except DP)
   - 60. Government — State/Federal/Local
   - 65. Communications Systems/Public Utilities/ Transportation
   - 70. Mining/Construction/Petroleum/Refining/Agric.
   - 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
   - 85. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   - 90. Computer/Peripheral Dealer/Distributor/Retailer
   - 75. User: Other _____
   - 95. Vendor: Other _____ (Please specify)
2. TITLE/FUNCTION (Circle one)
   - IS/MIS/DP MANAGEMENT
   - 19. Vice President, Asst. VP
   - 21. Dir., Mgr., Suprv., IS/MIS/DP Services
   - 22. Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   - 23. Dir., Mgr., Suprv., Analyst, of Systems
   - 31. Dir., Mgr., Suprv., of Programming
   - 32. Programmer, Methods Analyst
   - 35. Dir., Mgr., Suprv., OA/WP
   - 38. Data Comm. Network/Systems Mgt.
   - OTHER COMPANY MANAGEMENT
   - 11. President, Owner/Partner, General Mgr.
   - 12. Vice President/Asst. VP
   - 13. Treasurer, Controller, Financial Officer
   - 41. Engineering, Scientific, R&D, Tech. Mgt.
   - 51. Sales/Mktg. Mgt.
   - OTHER PROFESSIONALS
   - 60. Consulting Mgt.
   - 70. Medical, Legal, Accounting Mgt.
   - 80. Educators, Journalists, Librarians, Students
   - 90. Others _____ (Please specify)
3. COMPUTER INVOLVEMENT (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant.
   - A. Mainframes/Supermins
   - B. Minicomputers/Small Business Computers
   - C. Microcomputers/Desktops
   - D. Communications Systems
   - E. Office Automation Systems
   - F. No Computer Involvement

340558-6

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 NEPTUNE, NJ 07754

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD
CIRCULATION DEPARTMENT
P.O. Box 1565
Neptune, NJ 07754-9916

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 NEPTUNE, NJ 07754

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD
CIRCULATION DEPARTMENT
P.O. Box 1565
Neptune, NJ 07754-9916

Diplomatic ties: Managing a global network

BY JOHN HIGHBARGER

After a meal of spicy Indian food, the boss's stomach was just uneasy enough to keep him up all night. Not one to waste an opportunity, he used the time to address an issue that had concerned him for a while — manufacturing costs.

For several years, competitors had been unable to match his costs, giving his company a strong foothold in the marketplace. Recently, though, competitors' costs had become much more in line with his, and a few rivals had even surpassed his organization as low-cost producers. The time had come to seriously consider offshore manufacturing. The next morning, the boss launched a program, and offshore manufacturing soon became a reality for his firm. The program worked well, making the company again the low-cost producer in its field.

As a result of the offshore manufacturing effort, the company realized a substantial foreign market for its producers. Soon, the company had established five marketing offices scattered around the world, all needing information systems and communications support. And so, nine months after the chief executive officer had a spicy meal, the MIS officer got indigestion.

U.S. companies of all sizes are doing more international business. For MIS and communications executives at major corporations, this trend is nothing new. They have been on the international scene for years and have large staffs capable of solving diverse problems in international business. But for smaller companies, the information systems and communications support that they employ domestically are often inadequate for undertaking even relatively minor international endeavors.

When problems are encountered, some companies typically ignore them and let the international branches function without the communications and information systems support that the domestic office has grown to rely upon. However, many organizations are discovering that their real competitive advantage is in their use of technology and that the loss of MIS support can hurt them competitively in the international marketplace. Therefore, the only acceptable course of action may be the successful integration of systems and communications in the foreign offices. To accomplish this goal, MIS faces three areas of concern: technological difficulties, legal issues and management problems. The success of international systems implementation is directly dependent on the MIS executive's ability to manage these issues.

CHRIS BING

Technological problems encountered in an international systems implementation can run the gauntlet from simple to extremely complex. For example, I have seen information systems executives ship personal computers to European offices without first accounting for electrical differences. They were quite disappointed to discover they could not plug in their new personal computers.

Even something as relatively simple as installing telecommunications capabilities can become difficult in the global environment.

In Europe, digital telephone systems use an encoding structure different from the one used in the U.S., making the two systems incompatible. A U.S. digital system cannot properly decode a voice or data signal from a European encoded system. Complex technological problems like these cannot be easily remedied.

Highbarger is director of information management consulting for Coopers & Lybrand, headquartered in New York. His areas of specialization include strategic information systems planning and expenditure assessment and technology support.

In many countries, such as Saudi Arabia, the importation of computers and computer peripherals is highly restricted. The availability of specific products may vary substantially from country to country.

In addition, some countries' computer industries are protected by law to guarantee their market. It is not uncommon to find that the technology a company designates for international use is not available in certain countries. This discovery may then mean that the firm would have to use totally different systems that may not meet U.S. specifications.

Communicating in a foreign market also differs vastly. Most foreign telephone services operate as part of the government postal service. In setting up systems in various countries, MIS will encounter differing services, cost structures and bureaucracies that have to be dealt with in order to achieve the desired results. An organization can usually reach its desired technology goal, but this requires advance planning, rapid response and flexibility in its methods.

U.S. standards are not always the benchmark by which to measure foreign management practices. In many foreign local economies, rules of thumb that are generally accepted in the U.S. may be totally out of sync with the business realities.

Another area that MIS must confront is the legal issues inherent in global computing environments. In the U.S., businesses can freely communicate information electronically both in and out of the country and import technology hardware and software as desired. Outside of the U.S., this is not always the case. Many countries restrict the use of electronically encoded data, particularly when it relates to the transport of data beyond borders.

In a few countries, such as Indonesia, transborder telecommunication of data is prohibited. In other instances, information communicated in and out of the country may be subject to review. The typical American MIS executive has not encountered these concepts in the past. To him, these restrictions may seem like silly bureaucracy, but many countries are extremely serious about these laws; companies and persons found in violation of the laws are subject to substantial sanctions and criminal penalties.

Freedom of the press is not a global doctrine, even though it may seem odd to compare freedom of the press with communiques issued within multiple locations of the same company. However, foreign laws can be used to prosecute individuals for illegal transmission of data between countries.

Foreign regulations are not the only laws with which MIS must contend. The U.S. also has its own regulations overseeing international business. Legal exportation of personal computers or other technological devices from the U.S. requires an export license.

This export regulation applies even if the exported item is going to another part of the same corporation. The primary purpose of this law is to enforce the U.S. government's ban on the export of technology to certain foreign governments.

Managing an international network of computers and handling the sundry regulatory issues is a daunting endeavor for any business, large or small. For a small company, the logistics of installing hardware, software and communications support in remote locations are even more complex and difficult to master.

Without local MIS personnel who know the local market, vendors, language and traditions, the job of purchasing and installing hardware, software and telecommunications facilities can overwhelm a company. And yet, for the smaller organization, the option to have a dedicated technological resource on-site is not usually viable.

Therefore, for a smaller remote location to implement a system successfully, it is very important to establish local contacts who can negotiate the maze of local vendors and legalities. These contacts should be made early in the process and should be involved in the entire planning and implementation procedure for a project to succeed.

In larger foreign facilities, it may be possible to have local information systems management on staff. This has some clear advantages, such as the establishment of permanent knowledge for the company and the acquisition of local market knowledge. However, there can be problems with hiring local management. Training and experience levels are not uniform throughout the world. It may be difficult to identify nationals with the experience and education necessary to satisfy the company's objectives.

Another factor to consider is that the U.S. employment model is not uniform throughout the world. Once a person is hired overseas, it may be virtually impossible to disengage him for any reason. Thus, it is extremely important that personnel be selected carefully and correctly.

Once the staff is selected and on board, communication matters within the organization become critical. Do not assume that even an experienced manager from another country will have the command of English that a domestic executive has. Communication with foreign nationals has to be precise and specific to ensure that messages are not misunderstood or interpreted improperly.

U.S. standards are not always the benchmark by which to measure foreign management practices. In many foreign local economies, rules of thumb that are generally accepted in the U.S. may be totally out of sync with the business realities.

A human lawn mower

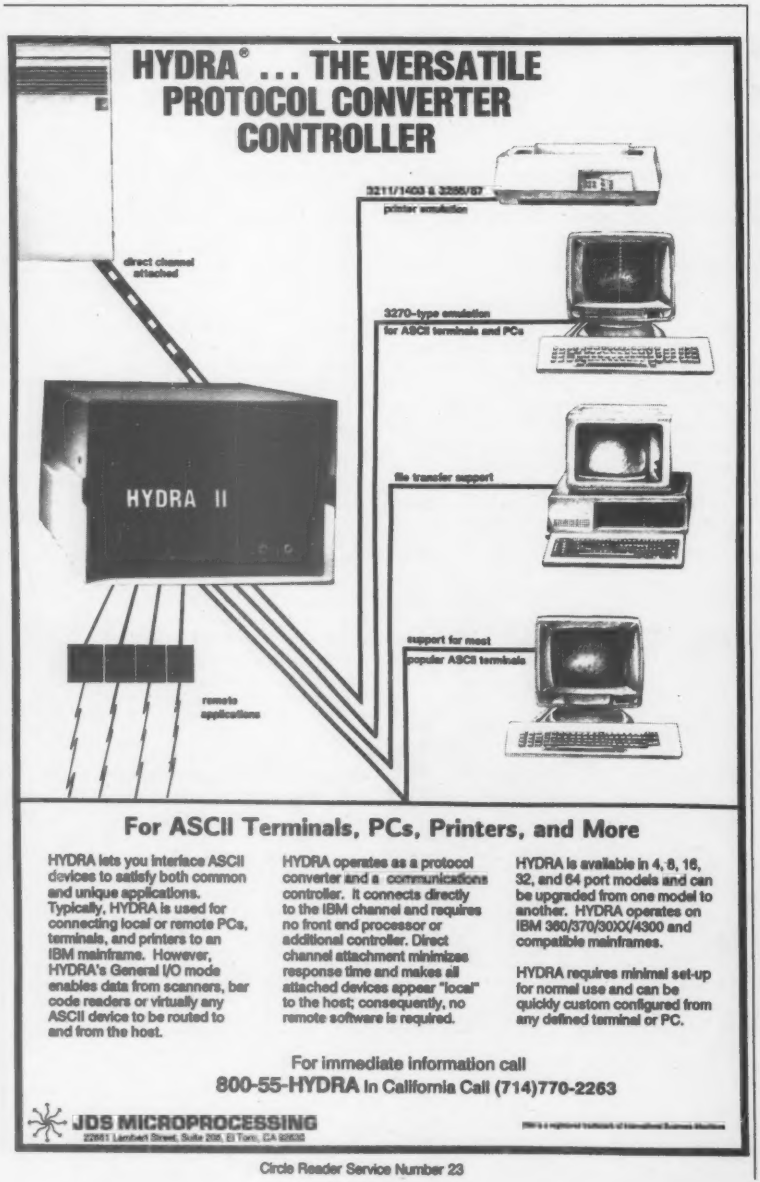
For example, in one foreign office I saw a worker sit down on the grass and begin to clip it with scissors. I restrained myself long enough to have someone check what the person was doing before I proceeded to chew out local management.

To my surprise, I discovered that the person earned wages equivalent to seven cents an hour. It did not take long to figure out that it was virtually impossible to recoup the cost of a lawn mower at that wage and that the local management made the correct decision in manually trimming the lawn. The message is clear: Managers must be careful about coming to hasty conclusions when operating in a different economy.

Global information systems can work. They can give an organization a tremendous advantage in the business world. But to be successful, MIS should observe the following:

- Local expertise must be included in the planning and implementation of systems in the foreign environment.
- All aspects of the project's implementation must be planned and all details verified prior to beginning the implementation.
- Each implementation in a foreign environment must account for local differences, which must then be reflected in the plan before it is started.

By following these general guidelines, a company, no matter what size, should be able to successfully implement systems in an international environment. And MIS officers will be spared a great deal of indigestion. ◆



Circle Reader Service Number 23

OSI's coming of age

From concept to products

BY HAROLD C. FOLTS

Happy 10th anniversary OSI. A new direction in establishing standards for information technology applications started 10 years ago in March with the first meeting of the International Organization for Standardization (ISO) Subcommittee for Open Systems Interconnection (OSI). The ISO returned to Washington, D.C., during February and March as a giant of standards making activities to celebrate a decade of OSI development.

From the first meeting of a handful of experts from a few countries, this committee is now made up of six active working groups with several hundred experts representing manufacturers, users, telecommunications providers and government interests from major nations around the world. OSI represents a major revolution of standards for the information technology industry.

Industry has shown its general support for the concept of OSI by contributing significantly to the development of the large family of specifications. Several industrial confederations have been formed, enabling companies to cooperate and ensure the widespread, consistent introduction of OSI products into an international, multivendor marketplace.

Among these confederations is the Corporation for Open Systems (COS), which was formed in the U.S. in January 1986 and now represents more than 60 prominent business and government organizations. There are also the Standards Promotion and Application Group of 12 manufacturers in Europe, the Japanese Promoting Conference for OSI, representing industry in Japan, and the National Protocol Support Center in Australia. In addition, the European Common Market and the governments of many nations have endorsed the introduction of OSI into the information technology industry.

It all sounds interesting, but is this frenzy leading anywhere?

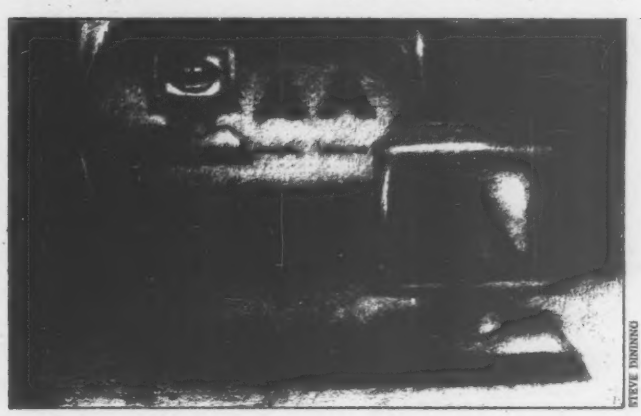
The analysis by the ISO that led to the establishment of OSI work in 1978 found that if each manufacturer was left to independently design an implementation for information technology applications, either one highly dominant force would emerge in the marketplace or there would be a proliferation of incompatible solutions that could severely constrain the user community.

Therefore, the concept of OSI emerged to lay a sound foundation that would enable free interchange of information among networked computer resources that could be assembled from a multivendor marketplace.

The ISO proceeded with this work in close coordination with the Consultative Committee on International Telephony and Telegraphy (CCITT) to ensure that telecommunications interests were appropriately considered.

OSI will have an effect on the many applications that are known and the many more that will emerge in the future as technology evolves. Such applications include electronic mail, funds transfer, manufacturing production line control, just-in-time arrival of supplies, point-of-sale for the retail trade, data processing systems, data base applications and numerous others.

OSI does not dictate how these particular applications are implemented but rather provides a common thread of interoperability so that system components from different manufacturers can be assembled to serve specific user applications. Each manufacturer is a specialist in its particular product area but may not be expert in all the areas that are necessary



STEVE DUNNING

Folts is founder and president of Vienna, Va.-based Omnicom, Inc., which provides information, education and consultation services relating to the OSI architecture and protocols for distributed information systems.

to meet specific operational requirements. As a result, the common thread of OSI that is also included in a product implementation opens a much more expansive marketplace to all of industry and gives the user freedom and flexibility to satisfy a wide variety of requirements.

The many benefits of OSI include the following:

- Freedom to implement any technology.
- A generic and flexible architecture.
- Compatibility among products.
- Unconstrained evolution of technology.
- Sharing of networking resources for integration of applications.
- Efficiency of operation and reduced costs in avoiding complex adaptations.
- Integrated system management.
- Freedom of choice in the marketplace.
- Stimulated marketplace competition.

OSI provides a generic architecture that structures the functions for systems to exchange information. It takes a modular, or layered, approach. Functions have been separated into groups that support specific tasks for facilitating the communications process.

Although the division is rather arbitrary, it has been agreed worldwide that there will be seven layers, each performing its unique mission in the overall open systems environment. The OSI layering, which has also been called the "onion skin architecture," provides for the logical grouping of associated tasks within a manageable structure.

The seven layers operate cooperatively as a system but are independently separable. As a result, OSI provides a great deal of flexibility in meeting a large variety of configurations.

The OSI family

The family of OSI standards consists of the Basic Reference Model, which is published as ISO 7498 and CCITT Recommendation X.200. The functions and services provided by each of the seven layers are described in the layer service definitions. Each layer also has a specification for one or more protocols that execute the functions.

Another important aspect is covered by the OSI network and systems management aspects, which are now under intense development by the standards organizations. This work includes Directory Services, an electronic directory that keeps track of users and resources within a system, which is soon to be approved by the CCITT as the X.500 series and by the ISO as International Standards 9594. In addition, drafts are being produced for various system and network management issues.

As a brief explanation of the OSI functions, the following descriptions start from the top of the seven-layer structure. The upper three layers are closely associated with supporting the user's communicating applications processes, which function independently of the underlying "bit pipe," or telecommunications media. Accordingly, the lower four layers deal with the transfer of the data between systems and are collectively identified as the Transport Service. Within the four layers of the Transport Service, the lower three represent the actual telecommunications function of the OSI environment.

- **Layer 7.** The Application Layer provides the window, or interface, between the local systems environment of the specific implementation and the common thread of the OSI environment. It establishes and maintains the associations between communicating applications processes. In addition, it contains the Application Service Elements, which support particular communications functions such as file transfer, virtual terminal, message handling, management services, transaction processing and distributed processing applications.

The OSI layering, which has also been called the "onion skin architecture," provides for the logical grouping of associated tasks within a manageable structure.

- **Layer 6.** The Presentation Layer negotiates, selects and maintains the syntax of the information being transferred between applications processes. It does not perform any syntax translation but only identifies the common transfer syntax. If any translation is required, it is accomplished with the local system.
- **Layer 5.** The Session Layer assists with the dialogue management of the communication. In coordination with the Application Layer, the Session Layer assists in selecting the turn of sending and receiving information, synchronization recovery and orderly termination of the communication.
- **Layer 4.** The Transport Layer provides integrity between communicating end systems and ensures that the required quality of service from the telecommunications resources is consistent.
- **Layer 3.** The Network Layer provides the routing and switching functions that select the paths through distributed telecommunications resources, such as circuit and packet switching as well as collections of internetworked resources.
- **Layer 2.** The Data Link Layer provides for the transfer of information over each leg of a transmission path between end systems and intermediate systems, or transit nodes, en route. For example, a

"... SmarTerm 240 Belongs on Your Shopping List."

DEC Professional, March 1987

For the IBM PC.
DEC VT240/241 Graphics Terminal Emulator

Network Ready - Network Connectivity Kits available for Bridge Communications, Ungermann-Bass, Datability's R.A.F. • **Coming soon:** Network Products ACS[2] and Novell's Netware VMS • **ReGIS Graphics** - VT241 Four Color Graphics with EGA • Position • Vector • Curve • Vertical and Horizontal Shading • Circles • Tilted, Slanted, Rotated Text • Standard Writing Modes • Custom Writing Modes • Custom Patterns • Custom Shading Patterns • Macrographs • Downloadable Characters • Report • Dump Graphics Screen to Printer • Integrated Text and Graphics Planes • Foreground Color Selection • Simulated Gray Scale • Sixel Graphics • Instant Zoom for Pixel to Pixel Display with Real Time Panning • Graphics Image Dynamically Scaled for Accurate Full Screen Display • Picture Capture and Playback • Landscape and Portrait Modes on Printers • Works with DECgraph, Datatrieve, SAS/GRAPH, RS/1, A-to-Z, All-in-One, GRAFMASTER, and others • **Tektronix Graphics** - Emulates 4010/4012/4014 • Light Vectors • Dark Vectors • Point Plot • Incremental Mode • Alpha Mode • Variable Character Size and Spacing • User Definable Alternate Character Set • Write-thru • GIN Mode • Dynamic Reduction Scaling • Instant Zoom to Full Resolution • Real Time Panning • Retrographics 640 Mode • Patterned Vectors • Complement Vectors • Printer Dumps • Plotter Dumps • Picture Capture and Playback • Works with PLOT-10, SAS/GRAPH, TELLA-GRAPH, RS/1, DISSPLA, and others • **Text and Convenience Features** • Emulates TTY, VT52, VT100, VT102, VT220, VT240 • Remappable Keyboard • User Programmable Function Keys • Host Definable Function Keys • Multinational Character Sets • Compose Key • Seven and Eight Bit Control Modes • 132 Columns via Graphics Mode, Special Video Boards, or Horizontal Scrolling on Standard Displays • True Double High/Double Wide Characters • Split Screen • Bi-directional Scrolling • Local Printer Support • Customizable Screen Colors • Debugging Trace Mode • Online Help Screens • Host Control of SmarTerm Operations • Smart Softkeys • Startup Command File • Easy to Use Setup Mode • Multiple Setup Configurations • Automatic Installation Program • Special PC Driver for VAX Word Perfect • Works with EDT, All-in-One, A-to-Z, and others • **File Transfer** • Text and Binary without Special Host Software • Error-Free with Kermit, XModem, PDIP • PDIP for Host Included • Wild Card Transfers with Kermit • Customizable Control Character Filtering • File Overwrite Protection • Extensive Timing Controls • Built In Test Pattern • Real Time Display Windows • Network Support • Support for Popular Networks with Additional Kit • **Hardware Supported** • IBM PC, PC/XT, PC/AT, PS/2, 100% Compatibles, IBM Color Graphics Adapter, IBM Enhanced Graphics Adapter, Hercules Graphics Adapter, Epson RX/FX Printer, HP LaserJet, and all IBM Keyboards.

SmarTerm is a registered trademark of Persoft, Inc. IBM and IBM PC, PC/XT, PC/AT, and PS/2 are registered trademarks of International Business Machines Corp. DEC, VT, ReGIS, Datatrieve, DECgraph, All-in-One, and A-to-Z are trademarks of Digital Equipment Corp. Retro-Graphics is a registered trademark of Digital Engineering, Inc. SAS-GRAPH is a trademark of SAS Institute, Inc. TELLAGRAPH and DISSPLA are registered trademarks of ISSCO Graphics Corporation. RS/1 is a trademark of Bolt, Beranek and Newman, Inc. GRAFMASTER is a trademark of Precision Visuals. Tektronix and PLOT-10 are registered trademarks of Tektronix, Inc. Hercules is a trademark of Hercules Computer Technology. Epson and RX/FX are trademarks of Epson America, Inc. Hewlett-Packard and HP LaserJet are trademarks of Hewlett-Packard Company. WordPerfect is a trademark of WordPerfect Corp. Copyright 1987. NetOne is a registered trademark of Ungermann-Bass. Ethertern is a registered trademark of 3Com Corporation. RAF Remote Access Facility is a registered trademark of Datability Software Systems, Inc. Netware is a registered trademark of Novell. Persoft, Inc. All Rights Reserved.

persoft

PERSOFT, INC. - 465 SCIENCE DR. - MADISON, WISCONSIN 53711 - (608) 273-6000 - FAX (608) 273-8227

Circle Reader Service Number 24

local-area network is a multipoint data link that serves a group of end systems within a geographically confined area. A data link may also represent the physical path between a subscriber and the access switch of a telecommunications resource.

• **Layer 1.** The Physical Layer provides the functions that enable passing the bit stream from the OSI environment to the connecting transmission media.

It is very important to understand that OSI does not just provide a rigid architecture as one way to support information technology applications. It is generic and has a great deal of flexibility to meet a wide variety of configurations.

Choices have been carefully incorporated into the family of standards so that specific applications can select a configuration that best meets operational requirements.

Individual profiles of configurations tailored to fulfill specific applications are emerging. For example, General Motors Corp. has pioneered the Manufacturing Automation Protocol (MAP) for the manufacturing community of interest. The MAP subset of OSI will support manufacturing production line applications. Much of the MAP configuration uses the same elements that will apply to many other configurations. Therefore, MAP will share a great deal of commonality with other configurations while still being able to optimize its particular applications.

Adopting OSI

While there is economy of scale to be realized through the use of common OSI protocols, a second economy of scale is further realized through the varied and large number of profiles of the communities of interest adopting OSI standards. For example, Boeing Computer Services Co. supports and sponsors the Technical and Office Protocol (TOP) configuration. In fact, because of considerable commonality, the MAP and TOP users groups have merged into a single organization to generate a set of OSI profiles.

The U.S. government has also jumped on the bandwagon with its Government OSI Procurement profile for federal applications. As other specific communities of interest around the world enter the OSI arena, such as the British government, they adopt a similar program.

Many more communities of interest will be emerging during the next few years.

The National Bureau of Standards (NBS) also has contributed significantly to the establishment of OSI by sponsoring the OSI Implementors Workshops. These workshops serve as neutral forums in which implementors assemble and agree upon protocol options and subset configurations to be included in their products.

The implementation specifications that have come from the NBS workshops have contributed significantly to the profiles of the communities of interest and to consistent implementation of the standards by industry.

While the communities of interest have recognized and accepted OSI as the foundation of their applications, there are still many questions about how industry is going to support implementations. The first positive signs include the intensive support that manufacturers have given the standards development activities and the establishment of cooperative organizations to promote the implementation of the standards in the marketplace.

It is interesting to note IBM's involvement in OSI development. The company has participated actively and constructively in the development of OSI from the beginning. It was also an early member of the Corporation for Open Systems. It has certainly not been expending its resources without purpose.

IBM's Systems Network Architecture (SNA), for example, has a similar structure to OSI. While the SNA protocols are quite different from OSI's for the most part, a functional mapping between the two architectures is a practical matter. Whether there is ever going to be a convergence between the two is yet to be seen; they may just continue to coexist.

There were items in the press last year about IBM encouraging the work on OSI Transaction Processing to adopt SNA LU6.2. While such a proposal had been introduced into the work, a much broader and more flexible solution was worked out by the committee, which has now produced the ISO Draft Proposals on the OSI Transaction Processing Service Definition and Protocol Specification. The proposals have gone to formal ballot as Draft Proposals.

Don't forget DEC

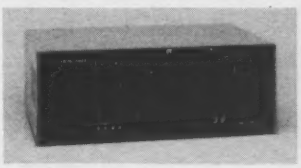
Digital Equipment Corp. also has been an active and constructive participant in the OSI work during the past years. The DEC architecture is very similar to that of OSI, and the company has been rapidly implementing OSI protocols into its products for some time.

Even with this activity, it will still be a while before any vendor can claim full OSI conformance. No vendor should yet be criticized for not having a full product line available — in most cases this does not mean that the company opposes OSI.

Another factor of confusion that has been of considerable debate is the Technical Control Protocol/Internet Protocol (TCP/IP). These protocols provide similar operational functionality to the Network and Transport Layers of OSI but are not a complete OSI-equivalent solution. The Department of Defense has officially proclaimed that it intends to migrate from TCP/IP to OSI standards within the next

This IBM Computer Talks...

To Almost Anything,
—Voice/Data PABXs, LANs, X.25 Networks
—Desktop, Laptop, Dial-In PCs and Minicomputers
—Async Terminals and Printers
...Through the DataLynx Gateway!



DataLynx/3174 does it all! With DataLynx, any PABX or LAN terminal can be on line to IBM. PABX features like rotary scan and camp-on work with DataLynx to make IBM connections simple. And any LAN terminal server becomes a gateway to IBM!

Thinking About X.25?
If you are, remember DataLynx. It works with almost any packet network async PAD, including Compuserve, TYMNET, and others.

What About Dial-in?
With IBM computers dial-in is often tough. With DataLynx it's easy and sure. Whatever network you use, DataLynx saves the session from line faults. No more lost sessions from noisy lines. Just redial, supply your password, and your session is alive and waiting for you!

Laptop Users, Too?
Don't worry about laptop PCs that can't support emulator cards. Install Local Data's low cost TruLynx/3270 PC software. TruLynx and DataLynx work together to give you IBM terminal emulation and PC-Host file transfer.

IBM and Async Hosts?
Of course. DataLynx supports two IBM and a number of Async hosts. Your PC or terminal can easily switch from an IBM to an Async host. Need an Async host to IBM connection? DataLynx does that too.

Solve Your IBM Connectivity Problems Now.
Call or write for a thirty day trial, demo, or just for more information. Our friendly staff is waiting to provide you with great service, support, and training. Join with hundreds of the world's largest corporations and government agencies, and build better networks with DataLynx and IBM.

LOCAL DATA
2771 Toledo Street
Torrance, CA 90503
Call (213) 320-7126
In Canada, (800) 267-1821
In UK, 44-753-76537

Local Data products are available and supported in the United States and Argentina, Australia, Austria, Barbados, Belgium, Canada, Colombia, Denmark, Finland, France, Federal Republic of Germany, Hong Kong, Iceland, Republic of Ireland, Italy, Korea, Mexico, Netherlands, New Zealand, Norway, Puerto Rico, Saudi Arabia, Singapore, Spain, Sweden, Switzerland, Trinidad, Turkey, United Kingdom, and Venezuela. Call for the distributor in your area.

© 1987. DataLynx, TruLynx and Local Data are trademarks of Local Data, Inc. IBM is a registered trademark of International Business Machines Corporation. Compuserve is a registered trademark of Compuserve Network Services. TYMNET is a registered trademark of Tymnet, a McDonnell Douglas Network Systems Company.

Circle Reader Service Number 25

couple of years.

Some companies in industry that currently have TCP/IP implementations are touting that they have a better solution for migration in the future. Users should be aware that there are a number of true OSI implementations ready now to satisfy their operational needs from such vendors as Scotts Valley, Calif.-based Touch Communications, Inc. and Retix in Santa Monica, Calif. While TCP/IP can, in fact, offer an immediate short-term solution, it may not be appropriate for long-term applications.

What's next?

What can the computer industry expect for the long term? The COS and the MAP/TOP Users Group are sponsoring in Baltimore June 5-9 the Enterprise Networking Event '88 International, a large-scale demonstration of the interworking of OSI products from many manufacturers of industry.

The event, representing the birth of the OSI multivendor marketplace, will demonstrate a variety of implementations available to customers. Although the OSI demonstration at the National Computer Conference several years ago turned out to be a superficial pasteup demonstration, the Enterprise Networking Event should represent real products that have gone through the full development cycle and conformance and interoperability testing, which will certify that the offerings comply with OSI.

The Enterprise Networking demonstration does not mean that OSI is complete and that a full family of products is now available. It represents only the next milestone along OSI's migration trail.

The introduction of OSI will be done in stages during a long period of time. Users with operational systems in place will have to follow carefully constructed migration plans. Likewise, manufacturers will need considerable time to integrate OSI into their existing product lines. Products under development will already have OSI in their plan, but it will take time to go from concept to production.

The initial migration to OSI will involve gateway adaptations that will enable product lines and user systems to evolve gracefully. Another approach to be taken involves the implementation of some OSI layers with OSI protocols while using either older proprietary or nonstandard protocols for other layers.

For example, an SNA application could use the lower five layers of OSI with the LU6.2 transaction processing capability on top. When the OSI transaction processing standards are approved, a transition can be made at the upper two layers.

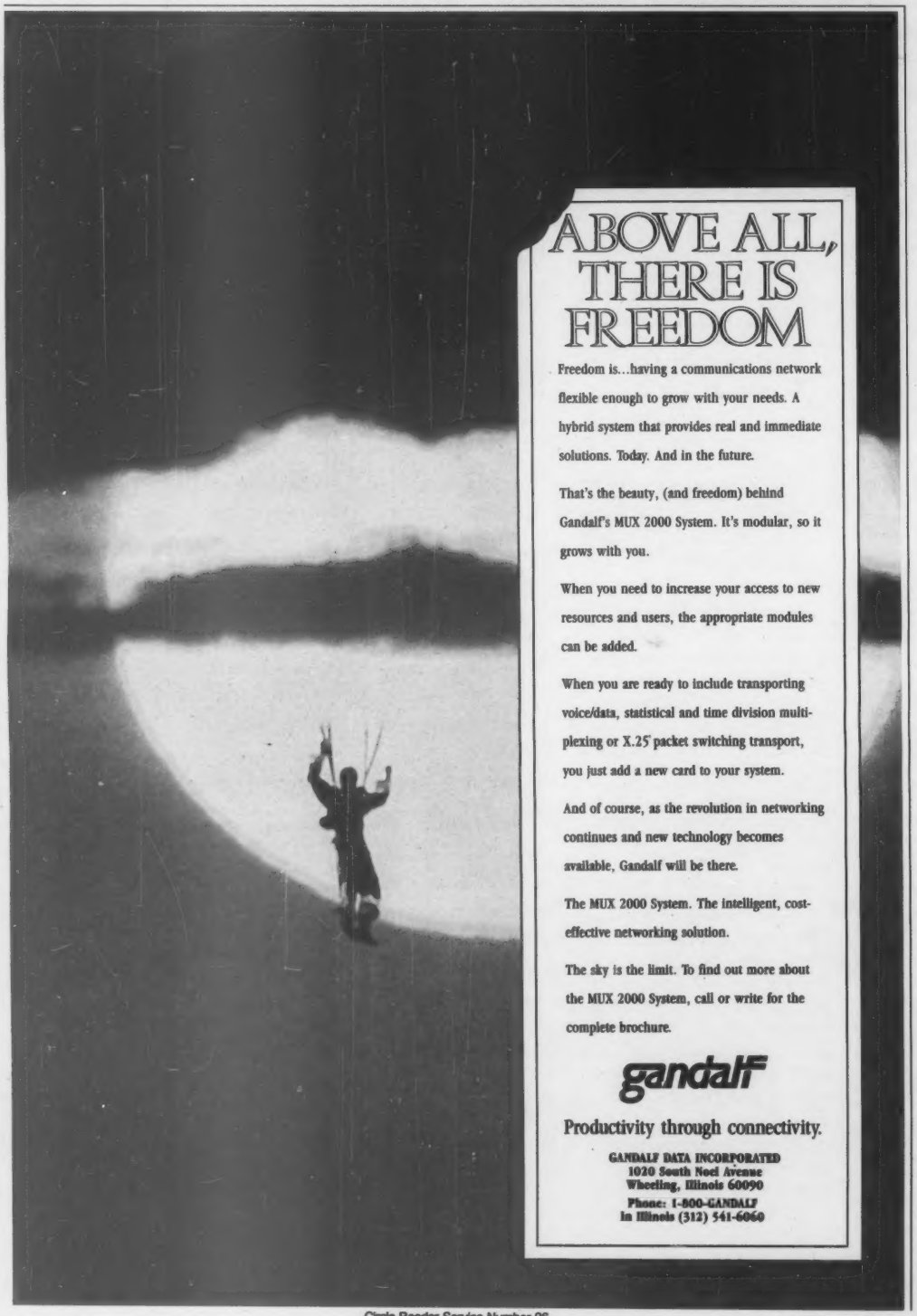
Planning is paramount

There are many approaches and combinations of approaches that can be taken to evolve into OSI over a planned migration period. If manufacturers or users are going to realize a transition in the near and distant future, they must take action now to construct migration plans that lead the way toward a full OSI environment.

Once the basic OSI structure is in place, evolution of products with new innovations and technology will be greatly facilitated. As a result, the information technology marketplace will be significantly strengthened.

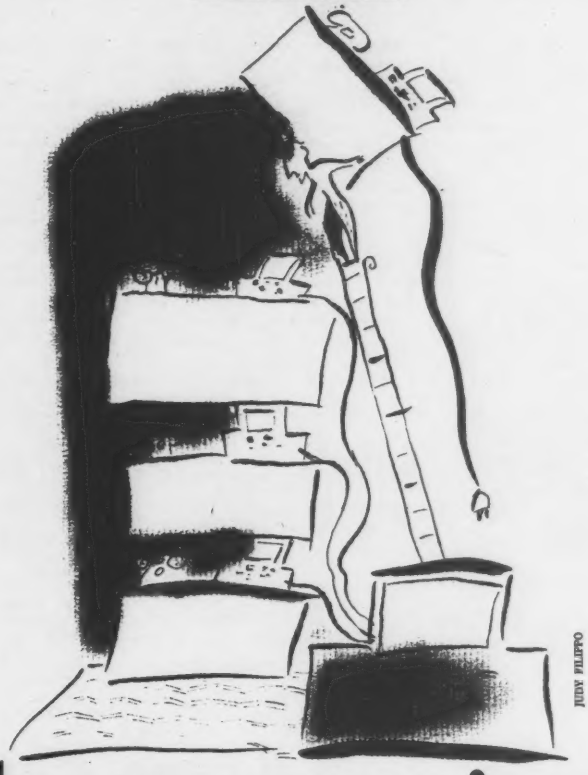
The answer to the question of whether OSI is fact or fancy seems to be very clear. OSI has widespread acceptance in industry with the many efforts that are under way to bring products to the marketplace over time. OSI also has widespread acceptance by the major nations around the world as a foundation for the information technology industry.

The final proof of OSI will be the effectiveness and the performance of the products that enter the marketplace. The first glimpse of that important stage will be at the Enterprise Networking Event in Baltimore. If the products are more than just vaporware and meet user application needs on a timely basis, the OSI revolution will be in full force and will secure its place in the future. ❖



Circle Reader Service Number 26

PROJECT ORGANIZATION



JUDY FILIPPO

Telecom project management tips

BY RONALD KOPITOWSKY

Recently a group of telecommunications professionals were asked, "What are the problems in managing telecom projects?" Without hesitation, the responses began.

The problems telecom managers encounter cover the entire spectrum of a project and most often are the result of poor communications, perceived confusion and a lack of appreciation for each other's traditional way of doing business. While tricky projects are familiar to almost any kind of business manager, there are certain project problems and solutions that are unique to those in the communications industry.

Common problems in telecom project management include:

- Top management allots less time than the project will take to complete.
- There is a lack of resources — not enough staff, money, facilities and so on.
- User needs are not clear and are constantly changing.
- There is a fear of initiating change within the organization.
- There is a lack of ownership when tackling a problem.
- It is difficult to plan for the future.
- It is difficult to forecast technology trends.
- Vendor management can be hard to deal with.
- Managing people is demanding.
- Communication among all levels in an organization is frequently poor.
- Turf issues need to be considered.

Today, more than half of telecommunications managers report to the MIS area. While there are strong reasons to structure an organization in this way, there are problems involved with such a setup. These problems often take root in the differences between addressing the two somewhat similar technologies.

Because many data center projects are solved using one or two key strategic vendors, such as IBM and Digital Equipment Corp., time is saved. But a telecommunications network project often involves transmission media, modems, multiplexers and packet-switching products. While a telecom manager can choose a single solution by using AT&T, this route often is not the best possible one.

Each of these network components are

Kopitowsky is a telecommunications specialist employed by a large Wall St. financial firm.

offered by several vendors. The number of combinations from which to choose can approach the hundreds. When a telecom project is done correctly, each of these options is evaluated carefully. Mistakes can be costly, time consuming and not follow the strategic direction of the company.

Limited access to top execs

Data processing vendors are different from communications vendors. It is rare to see a communications vendor have the same sort of access to senior management that, say, an IBM has. When there is a telecom problem, it might take a communications company days before it can discuss its solution with a customer's management. And unfortunately, in many cases, it is the ability of the telecom manager that is in question while the vendor-management meeting is being set up.

A telecommunications project has many components and phases. A telecom professional must properly manage each component if he is to achieve success. Most projects begin with a needs analysis and end with such concerns as documentation and maintenance. In between are the issues of project management techniques to help control the project and the resources dedicated to the project.

A key aspect of telecom project management is having the proper staff. Telecom managers must hire carefully. Hiring the wrong people can be a big mistake. If a telecom manager, or any manager for that matter, makes a mistake in hiring, he must quickly do something about the situation. It might be easier to move forward with little staff than with poor staff. Telecom managers must sharpen their hiring skills to avoid hiring weak performers, because time lost interviewing can be very valuable indeed when trying to manage a telecom project.

One of the early steps in a telecom project is the determination of needs. No solution can be effective unless it meets a specific need. If managers do not address the specifics, then the solutions may not be what they want. Users will request changes at the end of a project, causing delays.

Telecom professionals can determine needs by conducting interviews with users and top management.

Not all needs are the same, and telecom managers must learn to judge the differences. Some needs are absolutely necessary, others might be nice and still others might have little or no significance. This "fluff" may be pleasing, but no one will pay for it or use it for the next three to five years.

Checking to see what the competition is doing is also helpful at the needs analysis stage of a project; it may help crystallize thinking.

But where do needs come from? Sometimes they start with with the telecom management itself. It might see something wrong. Sometimes it becomes obvious that systems are obsolete or just old and hard to maintain. Other times, new vendor offerings may make sense for an organization. There will be times when existing solutions will not permit fast servicing or installation.

But the biggest source of needs comes from users. Even if change is motivated by other sources, such as vendors, telecom managers should go to users who, in most cases, provide new thinking.

Telecom managers may hear from users directly about what they want or don't have. These needs may also come from management. Wherever the need originates, telecom managers must get close to the source of the issues. In the search to provide the right solutions, they must make certain they are dealing with the correct problem.

A key aspect of telecom project management is having the proper staff. Hiring the wrong people can be a big mistake. It might be easier to move forward with little staff than with poor staff.

To find out the details of these needs, telecom professionals must interview users and take notes documenting these interviews. Next, they must send users a copy of the interview. This way, there will be no misunderstandings. Junior staff should not be used to accomplish this task. While it is time consuming, senior staff will have a better grasp of the issues. These senior staff members have a clear understanding of the business; not just a technical comprehension but also an insight into what each area does to make money for the organization.

Another source of needs information is through personal contact within the industry. Getting to know peers in other organizations can enable a computer professional to obtain information on what others are doing. This networking can be enhanced by active involvement in local communications associations.

A document should be prepared after the needs analysis to state clearly what was found. The document should be shared with all involved in the potential project.

A shared, concise statement of needs can take care of some of the previously mentioned problems telecom managers encounter in project planning. The document lets everyone know what the users

Circle Reader Service Number 27

want and prevents users from constantly changing their needs. The documentation also addresses the issues of communicating with all involved — both management and peers. It even creates an awareness of turf issues early in the project life cycle. If there are questions of who has to take charge and provide ownership, there is now a foundation for discussion.

Request for proposals

Once the needs analysis is finished, the telecom manager can pursue a solution from a vendor. Telecommunications solutions rely on many different vendors; therefore, a request for proposal (RFP) is necessary to establish a sense of fairness and uniformity among the various vendors.

If the manager has to deal with multiple vendors for the same solution, then the RFP becomes the starting point in the discussion. A refined RFP can even become part of a contract.

There are two ways to write an RFP. It can state the need and leave it to the vendor to provide a solution. This method sometimes provides for the most innovative solutions.

The more traditional RFP suggests a solution. It might ask specifically for a packet-switching network rather than ask for a method of moving information between locations. The benefit of this approach is greater control over the responses from vendors.

However, while the RFP is taking place, the project time clock is moving forward. Telecom managers could possibly save months on a project if only they could sidestep this portion of the process, because a carefully prepared, well-thought-out RFP can take months to arrange and months to get a proper vendor response.

Although there are some potential shortcuts in the RFP and RFP response stage, telecom managers will pay the price later if they take one. If the RFP is not clear, managers will have to meet again with the vendors and allow them to revise their proposals. They will also need more time to evaluate proposals, many of which may differ dramatically.

Selecting equipment

Eventually, telecom management must select systems. The more difficult the comparison among these systems, the longer it will take to review the proposals.

There are a number of ways to select equipment during an evaluation. Depending on the total impact of the system, telecom managers may wish to devote more or less time to the analysis.

If in the preliminary overview of the evaluation a manager determines grounds for removing a vendor, he should do it. This "shoot them dead" technique can save time, especially when everyone knows there is a serious flaw with one of the vendor solutions. But remember, this flaw must be the type to completely disqualify the vendor. Hopefully, there will be survivors to choose among when this process is finished.

If there is time, a detailed analysis of the solutions is needed. One method is to determine the relative importance of every item evaluated and assess a numeric value to that category. Telecom managers should then evaluate each proposed system a piece at a time and compare them against each other. Hence, to achieve the maximum numeric value, a system must clearly be among the best, while systems with less functionality should get low scores.

The evaluation will winnow out the strongest choice among the various proposed systems. Telecom managers must not forget to consider the cost of the system, however, because the strongest system might also be the most expensive. The final recommendation might not be the system with the most points but rather the one that is the best value when considering cost and functionality.

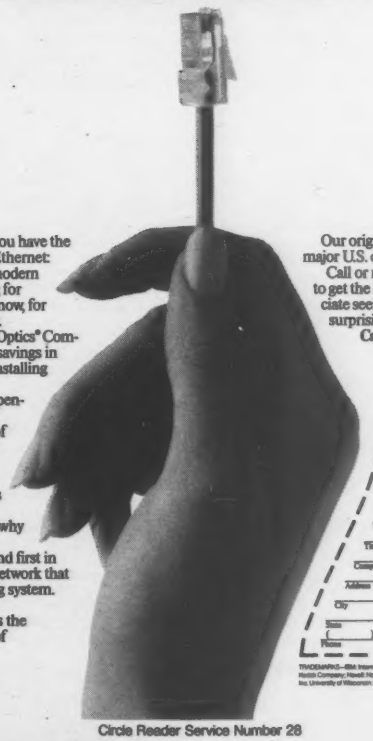
Once the system has been chosen, the project enters the contract stage. During the contract negotiation, telecom managers should decide exactly what is to be delivered. Previous discussions no longer have any meaning if they are not part of the contract. All the terms — system performance and so on — must be spelled out. If there are penalties, this is the time to deal with them. If there is an acceptance test plan, it must be part of the contract.

The contract negotiation can be divided into two categories, with the telecommunications staff deciding on the business issues and the lawyers deciding on the legal ones. Not knowing which issues are on the table can add months to the contract negotiation timetable.

During the system selection and installation, telecom managers must make sure that project documentation exists. Documentation is a written history. Managers cannot rely on knowledge kept by individuals to support complex systems. These systems operate 24 hours a day, every day. Qualified staff is needed to maintain these systems, and this staff relies on good documentation to do their jobs. If the documentation is inadequate, it will be impossible to meet the needs of users. If users are not satisfied, the project will continue to eat up time, money and other resources.

Maintenance is another area that telecom managers should address long before their systems are up and running. They must plan and coordinate the necessary spare parts, staff and training from the start of any undertaking, not at the end of the project or the planning cycle or as an afterthought.

SURPRISINGLY, THE BEST WAY TO RUN ETHERNET IS ALSO THE EASIEST.



If you have a telephone, chances are you have the right cabling already installed to run Ethernet: *unshielded* twisted pair cable. Yes, the modern cabling you're probably already using for telephone and data communications now, for the first time, runs Ethernet at *10 Mbs*.

The reason is LattisNet,® from SynOptics® Communications. The result is enormous savings in money, time and trouble for anyone installing an Ethernet local area network.

You'll avoid paying for miles of expensive coax cable. Avoid the noise, construction, disruption and downtime of installing it. And avoid the high cost of subsequent moves and changes.

LattisNet even comes with integrated Fault-Isolation and Diagnostics for instantaneous troubleshooting.

Our Connectivity Guide explains why the best way is also the easiest.

We should know. This is our second first in two years: LattisNet is also the only network that supports Ethernet on the IBM cabling system. And fiber optic cable as well.

The new *unshielded* LattisNet was the choice of Kodak, Novell, University of Wisconsin and many others.

© 1987 SynOptics Communications, Inc.

Our original LattisNet is installed in more than 60 major U.S. companies with a total of over 15,000 nodes. Call or mail this coupon, or your business card, to get the LattisNet Connectivity Guide. You'll appreciate seeing why the best way to run Ethernet is so surprisingly simple.

Call us at (415) 960-1100.

SynOptics Communications, Inc.

SynOptics Communications
329 North Bernardo Avenue
Mountain View, CA 94043
(415) 960-1100

☐ Send your Connectivity Guide to me immediately.
☐ Have a Sales Representative call me directly.

Name
Title
Company
Address
City
State Zip
( )
Phone

IF THERE ARE BETTER WAYS TO RUN ETHERNET, WE HAVEN'T INVENTED THEM YET.

TRADEMARKS—IBM: International Business Machines Corporation; Kodak: Eastman Kodak Company; Novell: Novell, Inc.; SynOptics and LattisNet: SynOptics Communications, Inc.; University of Wisconsin: University of Wisconsin

Circle Reader Service Number 28

Maintenance issues, while implemented near the end, start in the needs analysis phase. Managers must address the needs of the maintenance group, just as they take into account the needs of users. Maintenance issues should become part of the contract for the project. These issues cover the availability of spare parts for years to come as well as issues on availability and support.

Maintenance is not a place to save money. If a company cannot afford to maintain a system, it should not buy and install the system. Firms cannot afford to have their systems inoperable.

During the entire project life cycle, managers must keep a corporate objective in mind — to complete the project at a preselected time while using budgeted resources. These resources include both staff time and dollars.

Maintenance is not a place to save money. If a company cannot afford to maintain a system, it should not buy and install the system. Firms cannot afford to have their systems inoperable.

To help them coordinate this often difficult task, there are powerful tools available today — project management software operating on microcomputers. Personal computer-based programs automate proven project management techniques for managers.

One technique is to slice the project into as many small individual tasks as possible, managing these small tasks as small projects. Big projects move with their own momentum, while small, short projects most often are more successful because there is greater momentary visibility with more clearly defined and deliverable goals.

If all these smaller tasks are strung together, the project manager can see the total project. Some tasks may be sequential, while others concurrent. A flow chart of these activities can be made to display the entire project. One form of flow chart often used by project managers is a Program Evaluation Review Technique, or PERT, chart.

A PERT chart not only shows the graphic representation of the task but also computes a critical path, that is, the path of those tasks that directly affects the project outcome. While all the tasks need to be accomplished, there are some that can be done on a priority basis. The tasks along the critical path will extend the project by one day for each day these tasks take.

If telecom managers need to shorten a project, they should find a critical path and look at the associated tasks.

In cases in which management can affect the outcome of these tasks, then telecom managers should identify where management attention is needed. This attention can shorten the task time or assure completion on schedule.

If telecom managers can manage the time each task takes on the critical path, then the entire project will be successful.

Such flow charts should also show milestones along the way. Milestones are completed major events, good indicators of where the project is at any time. Many companies often tie vendor payment schedules to milestones.

The software operating on PCs does all the computations for critical path analysis. Whenever times are changed for one task, the PC does the calculations. The software enables managers to look at the project and know exactly what to do on a priority basis. It also lets them know what can drift for some time without having any impact on the project life cycle.

Top management can view "what-ifs" and see exactly what is happening on each portion of the project. By viewing the graphs and reports, it can participate in the planning. When there is a problem, telecom management can bring it to everyone's attention immediately.

Without these visual tools, all too often management cannot grasp the implication of a single task's delay. If the delay is on the critical path but early in the project, it is often hard to generate interest.

Manual labor

Before the use of PERT charts on microcomputers, all calculations were done manually. These computations were time consuming, and some people also considered manual reports not to be as credible as those generated on the computer. "What-if" analyses were not done.

There exists a growing market of project management software. Some of these tools for the IBM Personal Computer line include Mountain View, Calif.-based Software Publishing Corp.'s Harvard Total Project Manager II; Novato, Calif.-based Breakthrough Software's Timeline; and Superproject Plus by Computer Associates International, Inc. in Andover, Mass. There is also Apple Computer, Inc.'s Macproject for the Macintosh.

While all the various parts of a telecom project need to be done and done well, project managers need constant pressure "to do." All the problems and all the techniques to provide solutions keep a project on course. But someone must exert the pressure to move forward. It is easy to become engrossed in events and then begin to overanalyze activities. Someone (a telecom professional, perhaps?) must provide constant motivation to create movement.‡

If you are implementing, planning, or approving your company's computer equipment and related communications, you shouldn't miss this landmark exposition and conference. **ENTERPRISE** will be held at the Baltimore Convention Center. The exposition opens June 6-8, 1988, and the conference convenes June 5-9, 1988.

ENTERPRISE reflects the computer activities within your company locations: across the street, across the nation, or across the globe. It is the only computer networking show planned by users and suppliers with your needs as the number one priority. Major organizations have joined together to demonstrate the benefits of computer-aided engineering, computer-aided design, computer-aided manufacturing, and computer-aided office support activities. The exposition will attract representatives from a broad range of industries—from manufacturing and processing to financial services and health care.

This unique event uses Open Systems Interconnection (OSI), namely the Manufacturing Automation Protocol (MAP) and Technical and Office Protocol (TOP), to form the world's largest OSI global multi-vendor computer network.

Major organizations coordinating the exposition and network are: ALCOA and other companies from the process industries; Boeing; the British Department of Trade and Industry; the Commission of the European Community (ESPRIT/CNMA); the Corporation for Open Systems; Deere & Company; General Motors; TRW; and the U.S. Air Force with a coalition of aerospace industry corporations. The **ENTERPRISE Networking Event '88 International** is co-sponsored by the U.S. MAP/TOP Users Group and the Corporation for Open Systems.

ENTERPRISE *NETWORKING EVENT '88 INTERNATIONAL*

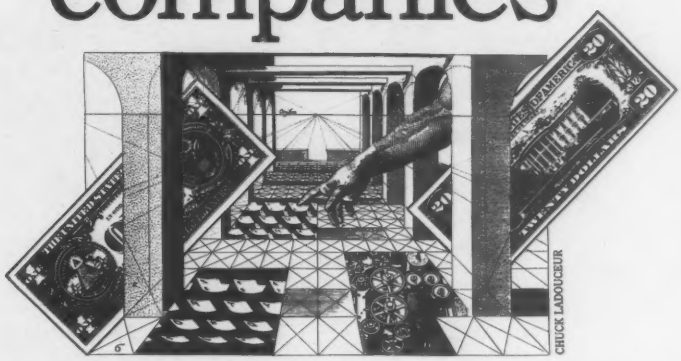
EXPOSITION: JUNE 6-8, 1988 ☐ CONFERENCE JUNE 5-9, 1988 ☐ BALTIMORE CONVENTION CENTER ☐ BALTIMORE, MD

For additional information, please contact the show manager: the Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, Mich. 48121. Write or call 313-271-1500.

Circle Reader Service Number 29

Wyoming's telecom lesson for MIS

Go west, young companies



BY RONALD BOSCO
& LARRY STOLZ

Today it is no longer possible to run a large or small organization efficiently without the use of advanced telecommunications and sophisticated computers. That is true whether the organization in question is a Fortune 1,000 firm, a state government, a federal agency or any of the other myriad groups whose data MIS officers are called upon to manage.

Telecommunications holds great potential as a tool for fostering economic development and diversification for all major organizations, private or public. To illustrate that fact, we have summarized a study performed for the state of Wyoming by Federal Engineering, Inc., a communications systems engineering firm in Fairfax, Va. The objectives of this study were to identify those industries that rely heavily upon telecommunications and to highlight as many businesses as possible that Wyoming could seek to attract, capitalizing on its unique competitive advantage.

Admittedly, only a fraction of the MIS community is employed in state and local government, but the data within the Wyoming study is information that all MIS officers may find valuable.

The results of the study show that a well-financed well-developed communications infrastructure is as vital to the economic development of a large company as it is to that of a large state. Ultimately, economic productivity has become a function of communications power, and economic innovation (whether carried out by a state's entrepreneurs or a company's entrepreneurs) is increasingly a product of that power.

Information technology — electronics, computers, telecommunications and the software that makes them function — is one of the fastest growing industry segments in the U.S. Advances in microelectronics, fiber optics and lasers have been the fundamental driving forces

Bosco is president and chief executive officer of Federal Engineering, Inc, an independent communications systems engineering firm located in Fairfax, Va. Stolz is the state telecommunications coordinator in the governor's State Planning Coordinator's Office for the state of Wyoming.

behind the growth.

Digital storage, which has been consistently doubling in capacity every year since 1960 while simultaneously dropping about 40% annually in unit price, adds further impetus, according to figures from the book *To Inform or to Control* by O. & G. Ganley. Processing speeds have also been doubling annually. Mainframes capable of processing 50 billion instructions per second will soon be commercially available; and personal computers priced at less than $1,000 will become both more powerful and ubiquitous. As a result of these factors, the number of general-purpose computers in the U.S. has been growing at an astronomical rate.

Consider that in 1953, only 50 computers existed worldwide. By 1975, this number had grown to about 155,000, a figure that doubled in 1980, according to the O. & G. Ganley book. The book's figures estimate that with the advent of the PC, some 12 million computers overall were in use in the U.S. at the end of 1987 and that 59 million PCs will be sold worldwide by 1990. The significance of this proliferation is truly monumental, especially when one considers that many of today's PCs are equivalent in computing power to an IBM 360 of the 1970s.

The primary factors in site selection are the availability and quality of the work force and, most importantly, the availability of reasonably low-cost state-of-the-art communications facilities.

Telecommunications technology is also advancing at an astounding pace. Transmitting tens of thousands of telephone conversations among cities over hair-thin optical fibers is already routine. Sending and receiving tens of millions of characters per second may be possible from the home by the 1990s using advanced communications techniques. The importance of advanced digital communications networking is becoming more apparent as the computer industry accelerates its migration toward fully distributed architectures.

Even IBM, once a staunch advocate of centralized host-based architectures, is now promoting distributed systems in the form of peer-to-peer communications, via its latest release of LU6.2, and the integration of PC and host processes.

Critical to these distributed systems are the communications links that connect them. Hence, along with the astounding rise of computer resources, there has been a corresponding rise in the use of data communications.

Between 1978 and 1987, for example, the installed base of data communications hardware grew at a rate of 21% per annum, from $3 billion to about $16 billion. Data communications circuit revenues have been keeping pace, growing from $4 billion in 1973 to about $28 billion in 1987, the Ganley book claims. These figures clearly demonstrate our national dependency on remote computer access and communications networking.

Sales projections compiled by the Computer and Business Equipment Manufacturers Association in December 1987 summarize industry growth trends in both computers and telecommunications. Computer industry revenues will jump from $217 billion in 1988 to $443 billion in 1996, while telecom industry revenues will increase from $201 billion to $311 billion during that same period.

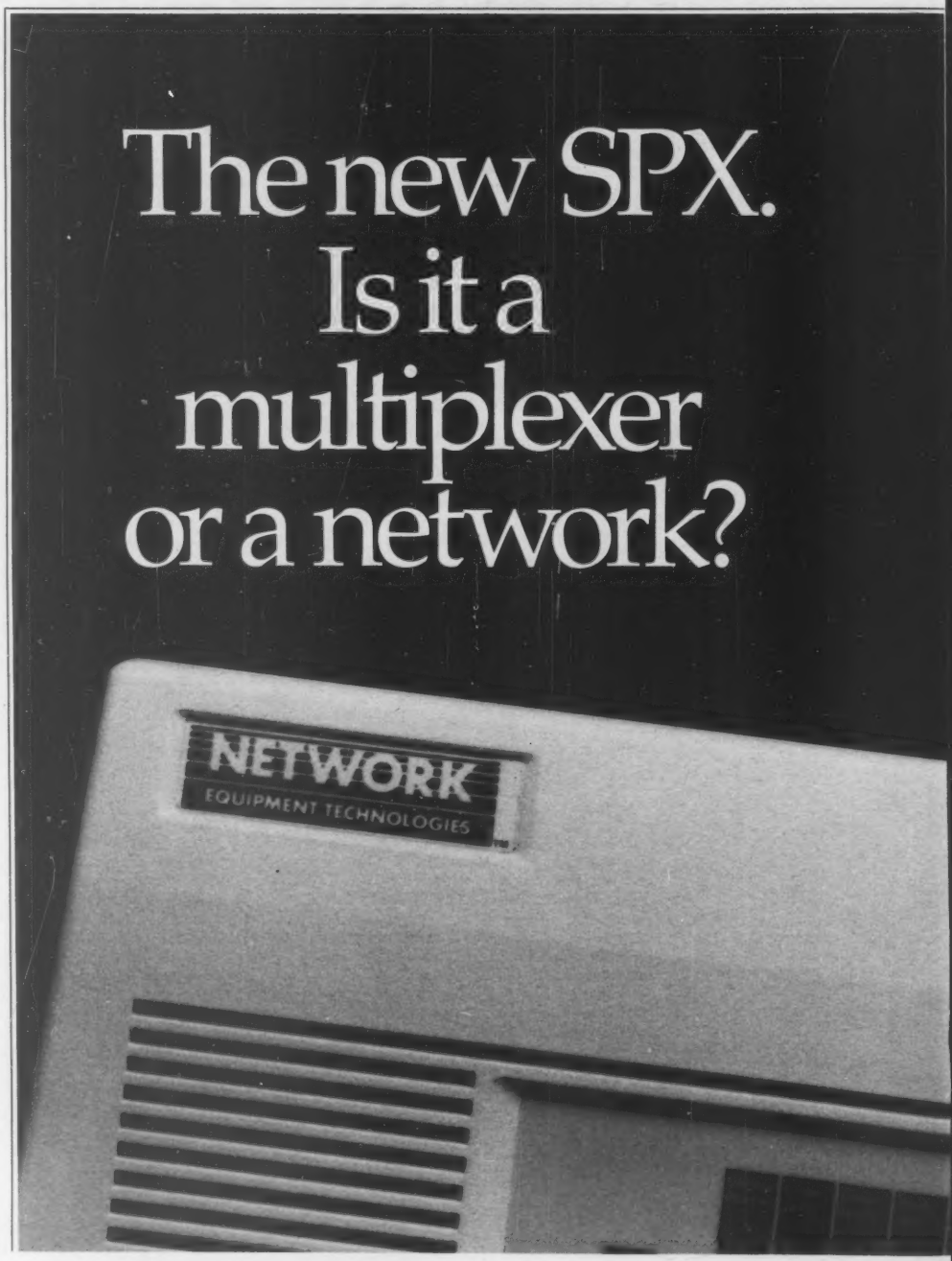
The pervasive growth of these information technologies has significantly reduced the geographic restrictions historically placed on a work force. No longer must labor be located near the input material or customer base. Information can be moved electronically at low cost and virtually instantaneously. In principle, therefore, information-based industries or information-based divisions of industries can be located anywhere, and the cost to relocate their fixed assets is relatively low.

The cost of acquiring and training knowledge-based workers, however, can be significant and must be taken into account. The primary factors in site selection are the availability and quality of the work force and, most important, the availability of reasonably low-cost state-of-the-art communications facilities.

Investing in communications

How does one judge, or even understand, the benefits of having an organization-wide communications system? That can be a difficult call, because networks operate in the background of daily business, speeding up and assisting the processes that result in profits but not themselves easily identified as part of those processes. We can see some of the benefits of an intelligent investment in communications through the example of the state of Wyoming.

For Wyoming, the most obvious category of direct benefit is significantly lower overall communications costs that can be realized via access to multiple long-haul networks. These savings are the direct result of competition among the common carrier providers in a deregulated environment. Because other business costs also tend to be low in Wyoming, the overall cost of doing business will drop for certain firms that locate there.



For this effect to be a strong motivator, however, these organizations must also be communications intensive, that is, their communications costs must make up a major portion of their total expenses.

U.S. businesses historically budget about 1% of their total expenses for telecommunications. As such, telecommunications clearly does not play a primary role in locating many organizations.

Exceptions to this general rule, however, are growing, according to a 1983 International Communications Association member survey. The survey found that high-technology firms, particularly in the computer and electronics fields, as well as service organizations, such as banks and information bureaus, spend a much higher proportion of their budgets on telecommunications. Even more important, as a 1986 study by the magazine *Telecommunications Product & Technology* found, is the fact that the largest proportion of high-tech firms' telecommunications costs is allocated to line charges.

Needs vary by divisions

Not to be forgotten, however, is that while more traditional industries may have only marginal needs for very sophisticated communications abilities, individual divisions within them may regard such facilities as crucial.

While a large manufacturing firm, for instance, may need physical proximity to raw materials more than it needs communications, its service department, on the other hand, which must be linked instantly to customers across the nation if not the globe, relies heavily on such technology. It may be that it would be useful to spin off that particular office and locate it remotely from the corporate headquarters.

For such organizations, the availability of reliable, low-cost communications on demand is critical and, to most, a strategic asset. Because, in many cases, they are forced to pay premium prices for their communications services today, they should be excellent candidates for relocation to Wyoming.

Advanced communications infrastructures inherent to certain industries are a good indication of potential candidates for relocation to or expansion in Wyoming. The heavy use of interactive mainframe computers or the proliferation of low-cost personal computers has created a growing need for low-cost, reliable data communications facilities.

Many traditional industrial areas within the U.S. cannot effectively accommodate this datacom growth trend. These locations still rely on old copper wire communications plants that were installed decades ago and were originally designed and optimized for analog voice traffic.

As the business environment in current growth areas such as the Sun Belt begins to mature, industry is once again looking for a more favorable setting for relocation and expansion. The same factors that motivated businesses to migrate from the Northeast to the Sun Belt are emerging once again in new locales such as Wyoming.

Because of its geographic location, Wyoming enjoys the presence of four facilities-based nationwide common carrier networks. This high density of communications services is not typically found in the West but is more usual in the heavily populated East Coast states where land, building, personnel and other operating costs are inherently higher.

Besides AT&T's existing interstate network, U.S. Sprint Communications Co., Williams Telecommunications and Western Tele-Communications, Inc. are currently in the process of constructing long-haul digital networks through Wyoming. With local points of presence, these carriers will provide advanced interstate telecommunications services at very competitive prices.

Natural crossroads

Wyoming is situated at a natural crossroads for both transportation and telecommunications. Certain types of businesses can benefit from this geographically central location within the lower 48 states. In particular, such positioning minimizes total communications costs for distance-sensitive services.

Traditional business incentives must, of course, be available in addition to advanced telecommunications facilities. In the case of Wyoming, economic vitality revolves around its industrial private sector. More than 97% of the work force is involved in nonagricultural employment, with the industrial sector accounting for approximately 85% of the $9.1 billion 1984 Gross State Product, according to Federal Engineering Press's book entitled *Pioneering the Information Frontier.*

The availability and quality of the work force is of primary concern whenever industry executives are considering a new plant location or when MIS is considering an outlying installation. Personnel training is especially important for those information-based industries that tend to be far more people intensive than capital intensive.

Federal Engineering Press's figures indicate that Wyoming has the second highest literacy rate in the nation, with an average of 12.1 years of education attained by the adult population. In addition, data from *Pioneering the Information Frontier* shows that Wyoming continues to invest in future generations with the highest per capita expenditures for schooling in the lower 48 states.

Yes.

It's a powerful new multiplexer *and* a next-generation network processor.

Designed for users having multiple locations and various connectivity requirements. For the user who must accommodate different applications, speeds, protocols and transmission media. For the user who also looks to future change and growth.

All with maximum control and minimum costs. How does the SPX™ do it?

The SPX is a new multiplexer with a highly versatile hardware engine.

The new architecture delivers larger capacity, more processing power, higher speeds, greater available bandwidth, and new standards of modularity.

It serves sites as small as eight channels or as large as 1,500 channels and 40 concentrated links. And by ordering the SPX in increments of eight channels, or four links, you never buy capacity you don't need.

Plus, it delivers channel speeds up to 19.2Kbps and link speeds up to 64Kbps.

The SPX is a sophisticated new network processor.

It connects multiple devices and sites into a single efficient network. With intelligent switching, dynamic routing, support for synchronous channels and a network management package.

It features a software driven architecture with a floppy disk drive—a foundation for change and growth in your data applications.

You benefit from lower operating and transmission costs, increased user productivity and equipment utilization, and substantial savings as your network needs change.

The SPX is a part of N.E.T.'s total solution to your multiplexer and network needs.

With the SPX, you can build a network that best meets your strategic requirements. A network of all SPXs. A network integrating N.E.T.'s most advanced wide-area Transmission Resource Managers, the IDNX® line. Or a network that incorporates N.E.T.'s entry-level networking multiplexers, the Series 2000 line.

The SPX also comes with something you won't find with competitive products: N.E.T.™ service and support.

N.E.T. specializes in building custom communication networks that best serve your application needs. And building an ongoing relationship with you, the client, to assure the continuing success of your applications.

Like to know more?

Call today for the SPX brochure or more information. 1-800-235-6935. Ask for Department M66

Our clients are winning.™

NETWORK EQUIPMENT TECHNOLOGIES

ComDesign Data Communications Group

IDNX is a registered trademark of Network Equipment Technologies, Inc.; N.E.T. and SPX are trademarks of Network Equipment Technologies, Inc.

The cost and availability of suitable physical facilities are also of paramount interest when evaluating sites. Wyoming provides an inviting opportunity with a low average cost per acre for improved commercial land.

Long-haul advantages

Certain businesses are likely to be attracted to Wyoming because of its position at the confluence of several nationwide long-haul networks. Such businesses include the following:

- Businesses that tie together these nationwide networks and provide services to the common carriers that own them as well as to major customers who use them.
- Organizations that, by the nature of their services, require the extremely high reliability that multiple networks can deliver.
- Businesses that can take advantage of the immense customer concentration that multiple long-haul networks can provide. Because this concentration can enable the sharing of a relatively high-cost facility among a large number of users, the economics of the situation are favorable.

Using the criteria above, Federal Engineering categorized candidate organizations into three primary segments: existing communications-intensive industries; newly emerging industries that will rely heavily on communications; and future industries that Wyoming can help create.

To remain profitable in this highly competitive world economy, existing corporations are constantly looking for methods to improve. This need for improved efficiency also applies to government. Thus, the following existing industries could accrue significant benefits by relocating or expanding in a state with the qualities of Wyoming:

Financial institutions. Access to competitively priced data communications is paramount to these newly deregulated entities.

Reservations processing. Firms that handle travel and other types of reservations on a nationwide basis can take advantage of Wyoming's central location by homing toll-free 800 calls here.

The federal government. The primary factor that could motivate the federal government, a $15 billion teleprocessing consumer, to locate certain of its more critical communications-intensive facilities in Wyoming is increased reliability via alternate routing.

Point-of-sale processing. Through the use of point-of-sale terminals, a customer's credit card is verified for retail transactions. Future growth into electronic funds transfer is expected in the short term. A solid communications infrastructure could help attract such a verification center to Wyoming.

Back-office processing. Low-cost data communications will enable Wyoming to offer the stock exchanges in Denver, Salt Lake City and elsewhere a favorable environment in which to process some of the overflow transactions that cannot be processed locally because of personnel shortages. This situation could, in turn, lead to additional back-office assignments from insurance companies, inventory specialists and others.

This example can be particularly instructive for MIS officers, whose business is increasingly dependent on finding some way, any way, of reducing costs. If much of the MIS function can be removed from the expensive real estate of company headquarters, then it can be made vastly cheaper. (However, such a move requires a company to make as strong a commitment to communications as Wyoming has demonstrated.)

Teleports. A teleport facility that provides domestic video up-linking and down-linking would complement the advanced voice and data services available via terrestrial networks.

Directory assistance. The southeastern part of Wyoming would be an ideal site for a directory assistance facility. This would enable various carriers to reap the associated service charges without requiring them to establish and manage proprietary facilities.

Learn by example

But what has all this to do with the average MIS officer? That Wyoming is a natural target for teleports and back-office processing is terrific, but why should that be of any particular interest to MIS as a profession? The answer is that the state of Wyoming is an organization like any other. The steps it is taking to encourage innovation and productivity can be copied by any organization.

Indeed, one lesson learned by business managers in the last few years is that businesses can be like states (and vice versa) and that their productivity and effectiveness is dependent on their ability to encourage their subdivisions to act aggressively and independently. Moreover, they must allow individual employees to act as if they were entrepreneurs.

Thus, if a corporation wishes to be innovative and productive, it must learn to think of itself differently. An organization can examine its setup and services almost as if it were a state government, providing such functions as merchant banking, managerial consulting, general strategic direction and, above all, communications for its people.

We can see the sort of innovative industries that might result from this kind of thinking and this kind of investment in communications in the emerging businesses that Wyoming has already set out to woo. In particular, the state is looking at the following:

Teleretailing. Employing telecommunications technology to display merchandise, accept orders, verify credit and transfer funds, teleretailing is projected to grow from $20 million in 1985 to $7.2 billion in 1991.

A Wyoming location would lower telecommunications costs by optimizing WATS to conform to the population distribution of the country as a whole.

International communications. Wyoming would provide a suitable location for an international satellite earth station, providing voice, data and video circuits to overseas locations, especially in the rapidly growing Pacific Rim.

Enhanced translation. Advanced 800 services will be the first in-WATS service offering that lets other long-distance companies compete on a par with AT&T. This factor enables other vendors to share equitably in the $4 billion per year toll-free calling industry, according to a study, "Telecommunications and Economic Development in Wyoming," published by Federal Engineering Press in 1987. Wyoming would provide meaningful benefits as the site of the translation facility necessary to implement such a service.

In addition to attracting businesses that are communications intensive, Wyoming is also in a position to create new industries — a philosophy MIS officers ought to consider.

The proximity of major independent long-haul networks makes Wyoming ideally suited to solve several problems that had been otherwise not economic enough to address.

Electronic clearinghouse. Value-added teleprocessing functions, including format conversions to effect intersystem compatibility, should ideally be centralized.

Network control facility. Wyoming would be an excellent location for an independently owned network control facility, which could monitor and route traffic from one digital network to another on a routine basis for traffic exchange, in case of a temporary traffic overload and in case of a transmission failure.

Voice mail. Such a relatively expensive resource as a voice mail facility, if located here, could enjoy both economy of scale benefits as well as trunking efficiency benefits.

Nationwide enhanced 911 data base. Wyoming would also be an excellent site for a nationwide intelligent data base system to administer enhanced 911 programs.

The Federal Engineering study concludes that Wyoming should diversify into knowledge-based industries. Establishing an information-based economic sector in Wyoming will occur more readily once the suitably advanced communications infrastructure has been fully deployed.

In particular, the need for economical high-speed digital communications facilities is paramount, not only for attracting information and software professionals, but also for attracting the next generation of hardware assembly plants, which are being built around remote process control and telemetry.

This requirement is complemented by the need for effective vocational training and retraining and for widespread access to university-level and postgraduate course material.

Likely candidates

The best potential for Wyoming lies in attracting firms in the identified target industries whose basic business is largely dependent on communications and not on the transportation of goods. These are firms that can take advantage of the quality of life, skilled personnel resources, favorable tax treatment and low-interest start-up loans that Wyoming offers.

The general methodology and approach employed in this study are equally applicable to other states. However, it should be recognized that identifying target industries is merely the first step toward realizing the potential of telecommunications as an economic development tool.

The state and its investment in communications show MIS how all major organizations can and should benefit from communications technology.‡ ❖

Reach over 30 international computer markets with just one toll-free call!

International Marketing Services connects you to IDG Communications' global network of more than 65 publications in over 30 countries. And it's your one-stop service for international media buying. In fact, International Marketing Services is the only service that allows you to reach foreign computer professionals in MIS, communications, third-party and PC markets — all through one contact at our international headquarters.

Advertise in our international network of computer publications and receive up to 15% in corporate discounts, full 15% agency commission, billing in U.S. dollars, no value-added tax, market information, expert native translation, and a fixed exchange rate for the length of your contract.

Just dial 1-800-343-6474 and ask for Frank Cutitta, Managing Director of International Marketing Services (in MA, 617-879-0700). You'll reach computer professionals in more computer markets, in more countries — in less time — than ever before.

Just ask for our FREE information on computer advertising in any of these foreign markets:

Argentina, Asia, Austria, Australia, Brazil, Canada, Chile, Denmark, Finland, France, Greece, Hungary, India, Israel, Italy, Japan, Mexico, Netherlands, New Zealand, Norway, People's Republic of China, Saudi Arabia, South Korea, Spain, Sweden, Switzerland, Taiwan, United Kingdom, USSR, Venezuela, West Germany.

International Marketing Services

A division of IDG Communications

Ellen Levin, Eastern Marketing Manager
375 Cochituate Road, Box 9171
Framingham, MA 01701-9171
(617) 879-0700/(800) 343-6474

Essie Barnes, Western Marketing Manager
3350 West Bayshore Road, Suite 201
Palo Alto, CA 94303/(415) 424-1001

An IDG Communications Publication

products

TECH TALK

Connectivity stars, AI gets second billing in DEC debut

By Michael Tucker

You find connectivity in the darnedest places.

This issue of *Computerworld Focus* is devoted to the single topic of communications/connectivity. Yet it becomes apparent that these two are not so much a topic as a requirement of modern computing. Increasingly, the ability of machines and applications to talk to one another is taken as a given.

Thus, it has become difficult to talk about "communications" as if it were a separate entity. Instead, you must tack it on as part of other subjects.

For example, in March, Digital announced yet another upgrade of its AI Vaxstation. This offering is a workstation based on the Vaxstation Models 3500, 3200 and 2000, which is a desktop machine. The artificial intelligence version differs from standard Vaxstations in that it has been specially configured for use in AI-related applications.

The modifications are significant but actually less exotic than you might think. The main upgrades are in the amount of available memory and in the language software. The AI Vaxstation runs, for instance, the DEC VAX LISP language and OPS5, an expert system building tool. The microprocessor and the system software, among other things, are essentially the same as in any VAX.

The DEC rollout surprised analysts; AI has been rather out of fashion lately.

DEC has been in the AI market before. In fact, you can make a fairly good argument that more AI-related software has been designed on VAXs and, before that, DEC PDP-11s, than on any other machine. In fact, DEC has been selling a dedicated AI machine based on its Microvax II for some years.

But the fact that DEC decided to display a new AI Vaxstation this year was something of a surprise to some analysts. AI has been rather out of fashion lately. After failing to live up to the expectations of the late 1970s and early '80s, AI has come to be seen in some quarters as an obsolete technology.

Digital's *Vaxstation 3500 gets AI functionality update*

AI's image problems haven't been helped by the fact that the most well-known vendors of symbolic processing machines, which are tightly associated with AI, have experienced severe financial trouble in recent months. Lisp Machine, Inc., formerly in Cambridge, Mass., went out of business. Its rival and close relative, Symbolics, Inc., also in Cambridge, has had to lay off significant factions of its work force — up to and including the firm's founder and chairman, Russell Noftsker.

Ironically, though, as AI's stock with the public has crashed, it has begun to find real applications in the commercial world. In particular, expert systems, running on standard microprocessors, have actually turned into an industry. Ergo, the AI Vaxstation.

But the kicker for the new Vaxstation is in the way it is being sold. Look at its press release or marketing information, and you notice a curious fact. The AI aspects of the announcement have been played down. In the literature, the term "artificial intelligence" appears only in the bottom of the headline. What gets first billing is that the new Vaxstation offers all the traditional networking capabilities of a DEC machine.

Specifically, DEC intends the AI Vaxstations to be development platforms for MIS professionals in those fields that already use expert systems the most — finance, insurance and

Continued on page 60

Tucker is *Computerworld Focus*'s features editor.

PRODUCT CLOSE-UP

HP net management tool

Hewlett-Packard Co. has taken dead aim at IBM, Cincom Systems, Inc. and others in the network management market with HP Openview, a system designed to manage wide-area and local-area multivendor communications.

At the core of Openview is HP Openview Windows, a graphical user interface running on HP's Vectra PC, an IBM Personal Computer AT compatible that reportedly provides a central point from which a network manager can monitor and troubleshoot local and remote networks. The Windows user interface for the HP Vectra PC, which includes a Vectra PC, costs $6,000 to $8,000.

Openview consists of four products for wide-area networks management: Status and Diagnostic Monitor software, which monitors the status of remote HP 3000 systems; Performance Monitor software, which collects network performance information; Network Command Interpreter software, which enables a manager to execute commands and programs remotely; and the In-Service Transmission Impairment Measurement Set (ITIMS) software, which allows managers to perform centralized line analysis and fault isolation.

New language said to link Apple Hypercard, DEC VAX. Story page 62.

According to Willem P. Roelandts, vice-president and general manager of HP's Information Networks Group, Openview complies with the existing International Standards Organization's Open Systems Interconnect (OSI) network management standard. Roelandts said that

Continued on page 62

BLUE BEAT

Tailor-made IBM

Brian Jeffery

IBM management gave it a green light at a conference in 1985 that brought together the company's top executives worldwide. John Akers cites it as one of the bright spots for fiscal 1987. More than 6,000 IBM staff members do it in the U.S., and IBM Japan has declared that it has attached a high priority to doing it. Management in the U.S. Marketing and Services Group, IBM's U.S. marketing organization, regards doing it as a key strategic priority, because at the least it significantly improves the odds of winning competitive procurements. Some IBM personnel describe it as IBM's secret weapon against Digital and other interlopers. IBM is increasingly proposing to do it for its large customers.

"It" is systems integration. In theory, IBM's systems integration is "the business of adding value by assuming responsibility for combining information, products and services into a defined customer business solution."

In practice, it translates into IBM or a designated third party assuming responsibility for implementing a complex customer solution that may include a wide range of non-IBM systems, custom-developed products, custom programming and extensive service and support components.

Normally, all this activity is done on the basis of a formalized proposal. IBM brings in its third-party systems integrator to set up and manage a project that may last up to five years. En route, IBM works with any number of third-party suppliers and

Continued on page 63

Apple courts execs, MIS

Tries to undercut IBM with low-cost communications tools

Apple Computer, Inc.'s headlong charge into MIS got a bit more accelerated early this year with the introduction of several mainframe-oriented communications tools.

The first of these was Macapple, a software implementation of IBM's LU6.2 and PU2.1 communications protocols, which, at a price of $2,500 for a site license, allows the Macintosh computer to function in an IBM Systems Network Architecture environment.

At the same time, Apple introduced the Macworkstation, a software tool that allows developers (MIS-oriented developers, in particular) to link the Mac interface with mainframe and minicomputer programs. Programmers can continue to work in their familiar mainframe-oriented languages and still link their applications to the Macintosh without ever having to learn Mac programming. Macworkstation is priced at $5,000 for commercial resale but sports only a $2,000 license fee for firms using the product internally.

A Mac for the boss

That pricing split is significant. Apple's target is the MIS department, pure and simple. The Macintosh is seemingly being slowly positioned as the end-user "terminal" of an executive information system.

This is, of course, the role that many analysts projected for the IBM's Personal System/2 running under OS/2. In effect, Apple appears to be making a bid for that spot before IBM can solidify the PS/2 market. And Apple is willing to take significant cuts in its profit margins to make that happen.

All of this is significant in light of Apple's recent alliance with yet another IBM rival, Maynard, Mass.-based Digital Equipment Corp. Together, DEC and Apple might present an entirely non-Blue MIS option, with DEC VAXs or Vaxclusters taking the role of mainframe and Macintoshes running as personal computers.

In addition, at last February's Uniforum, a Unix /usr/group trade show, Apple introduced A/UX, its version of Unix. At that time, Apple spokesmen — including Apple Chairman John Scully — openly talked about A/UX as part of a larger plan to introduce the Mac to MIS. The argument was that the robust Unix environment would give the Mac additional power to enter the DP world.

The question remains, however, whether the Mac can be the Apple of MIS officers' eyes. While the Mac has gone far to overcome its noncommercial image, its user base is still mostly among end users. MIS officers have not been noted for their love of the box, just as they have hesitated about DEC and, for that matter, about Unix. — MICHAEL TUCKER

Circle Reader Service Number 111

Tech Talk

Continued from page 59

banking, among others. Applications can be put together on the Vaxstation — say, a decision support package for a currency trader — and then dropped to Microvaxes or standard Vaxstations on executives' desks. One possibility is that those applications might be made available to the Apple Macintosh, given the machine's newly announced links to DEC.

The point, though, is that the application can be delivered. While the Vaxstation can function as a stand-alone system, it's not meant to be sold as one. It is meant and marketed as a highly connectable device for the remote development of a certain kind of software. That the software in question happens to be AI related or, rather, expert system related, is almost a secondary consideration.

AI VAX facts

The AI Vaxstation 2000 sports 6M bytes of memory, a 19-in. monochrome monitor and a 71M-byte disk drive. The 3200 version has a CMOS version of the VAX microprocessor that performs at 3½ times the speed of the Microvax II processor. The 3200 has 16M bytes of memory, a 19-in. monitor, a 159M-byte disk drive and a 95M-byte tape drive. The 3500 also boasts a CMOS processor. In addition, it has 16M bytes of memory, a 19-in. color monitor, a 280M-byte disk drive and a 296M-byte tape drive. Memory is expandable to 32M bytes.

Prices for the systems vary according to the configuration.

PRODUCT CHECKLIST

While IBM's Systems Application Architecture is a standard that is only now taking shape, its Systems Network Architecture (SNA) is very mature. SNA is even an industry, as seen in **Communications Solutions, Inc.'s** recently introduced **Maxess SNA Gateway** for personal computers and PC local-area networks.

The Maxess product is a board that fits into a standard IBM Personal Computer, PC compatible or IBM Personal System/2 machine. According to the vendor, the PC can then communicate with an IBM mainframe as though it were an SNA device.

There are two kickers. First, Maxess supports both IBM's Advanced Program-to-Program Communication and 3270 protocols. Second, while the dedicated PC can communicate with SNA networks, it can also fit into LANs of other, non-dedicated PCs. In the process, it provides a gateway into the SNA world for every device in that PC network.

In effect, it means that MIS officers can make entire PC LANs SNA compatible for the cost of a single board, or $4,995.

Communications Solutions, 2125 Hamilton Ave., San Jose, Calif. 95125.

Circle Reader Service Number 112

At some time in the near future, IBM says, it wants to tie all its systems to one another and to other companies' systems via its Systems Application Architecture (SAA). But some analysts have said that SAA has a long way to go before it can be called a blueprint.

Now, however, **Network Software Associates, Inc.** has released Version 4.0 of its **AdaptSNA** group of personal computer-to-host communications software products, which is already SAA compatible. These products run on IBM Personal Computers, PC XTs, ATs, Personal System/2s and compatibles and provide Systems Network Architecture facilities.

The firm said AdaptSNA is SAA compatible because it is now "link independent," which means the same AdaptSNA package can be used over any physical link from coaxial cable to modems.

Some observers question whether this makes AdaptSNA truly SAA compatible or whether SAA is well enough defined for any product to be categorized as SAA compatible. However, AdaptSNA may be significant if only because it shows that SAA is now sufficiently firmed up enough for vendors to make rational arguments about their conformity to it.

Prices for AdaptSNA range from $585 to $785, depending on the host.

Network Software Associates, 22982 Mill Creek, Laguna Hills, Calif. 92653.

Circle Reader Service Number 113

Optical fiber communications and personal computing seem to be linking up, at least in theory. **Black Box Corp.** has introduced its **Fiber Optic PC Board**, which allows personal computers and compatibles to communicate via optical fiber just as easily as they do with twisted-pair. The half-height cards are available with either one port at a price of $255 or two ports for $320.

Meanwhile, the advantages of linking PCs with fiber optics have recently been examined in the Corning Glass Works internal publication, "Guidelines." In its Volume 4, Number 1, GL-13 issue, "Guidelines" presents interviews with futurists and industry insiders on the potential uses of fiber-optic cabling in the home and the home office.

The experts' conclusion is that optical cable's extremely broad bandwidth would make it possible for the average home to support everything from videophones to supertelevisions to PCs.

Black Box, P.O. Box 12800, Pittsburgh, Pa. 15241.

Corning Glass Works, Corning, N.Y. 14831.

Circle Reader Service Number 114

Compact disk/read-only memory (CD-ROM) disks have the power to contain vast amounts of data. A jukebox CD-ROM player can provide a personal computer with large amounts of data, rivaling mainframe-style data storage devices.

Now, **Meridian Data, Inc.** has unveiled two communications servers that allow multiple CD-ROM drives and data bases to fit into local-area networks. **CD Net** is the smaller of these servers and supports three half-height 5¼-in. slots, a network board with an Intel Corp. 8088 processor and a power supply. It costs $2,995.

CD Server, meanwhile, is meant for large LANs. It has up to six half-height 5¼-in. slots, a network board with either an Intel 80286 or 80386 processor and a power supply. It costs $5,995.

Meridian Data, Suite 101, 4450 Capitola Road, Capitola, Calif. 95010.

Circle Reader Service Number 115

Sign up now... for the FREE INGRES seminar in your area.

Reservations are going fast! Make sure you have a seat at our FREE seminar. Check the location and date of the seminar nearest you, then complete and mail the reply card.

Or, for faster registration, call us toll-free at 1-800-4-INGRES (1-800-446-4737). In Canada call (415) 748-3444.

AZ	Tucson	12-May-1988
CA	Irvine	26-May
	Los Angeles	24-May
		15-Jun
	Sacramento	17-May
		22-Jun
	San Diego	14-Jun
	San Francisco	18-May
		23-Jun
	San Jose	19-May
		21-Jun
CO	Colorado Springs	5-May
	Denver	7-Jun
DC	Washington	5-May
		9-Jun
FL	Tampa	10-May
GA	Atlanta	24-May
IA	Des Moines	8-Jun
IL	Chicago	26-May
		22-Jun
IN	Indianapolis	2-Jun
KY	Louisville	10-May
MA	Boston	15-Jun
	Burlington	14-Jul
	Newton	12-May
ME	Portland	7-Jun
MI	Southfield	25-May
MN	Minneapolis	17-May
MO	St. Louis	19-May
NC	Raleigh	8-Jun
NJ	Saddle Brook	26-May
		23-Jun
NM	Albuquerque	8-Jun
NY	New York	19-May
		16-Jun
OH	Toledo	9-Jun
OK	Oklahoma City	10-May
OR	Portland	5-May
PA	Philadelphia	14-Jun
	Pittsburgh	17-May
RI	Providence	17-May
TX	Dallas	4-May
	Houston	18-May
	San Antonio	10-Jun
UT	Salt Lake City	11-May
VT	Burlington	24-May
WA	Seattle	4-May
WI	Milwaukee	24-May
CANADA		
ALB	Calgary	3-May
ONT	Ottawa	26-May
		30-Jun
	Toronto	5-May
PQ	Montreal	18-May
	Quebec	1-Jun

INGRES
RELATIONAL TECHNOLOGY
1080 Marina Village Parkway
Alameda, CA 94501

YES! I want a reservation to your FREE seminar on INGRES Total Performance Architecture™

To register for this FREE seminar, refer to the schedule next to this ad, then complete and mail this reply card today. Please be sure to include the names and titles of other people in your organization who will attend. Thank you.

☐ Reserve my seat at the INGRES seminar in
(City) _____ (State) _____, on
(Date) _____
Name _____
Title _____
Company _____
Phone (_____) _____
Address _____
City _____
State _____ Zip _____

My current DBMS is (are) _____
My operating system(s) is (are) ☐ VM/CMS
☐ MVS ☐ VAX VMS ☐ ULTRIX ☐ UNIX
☐ MS/DOS ☐ OS/2 ☐ Other _____

My RDBMS applications are: _____
_____

Please reserve space for the following people:
Name _____
Title _____
Name _____
Title _____

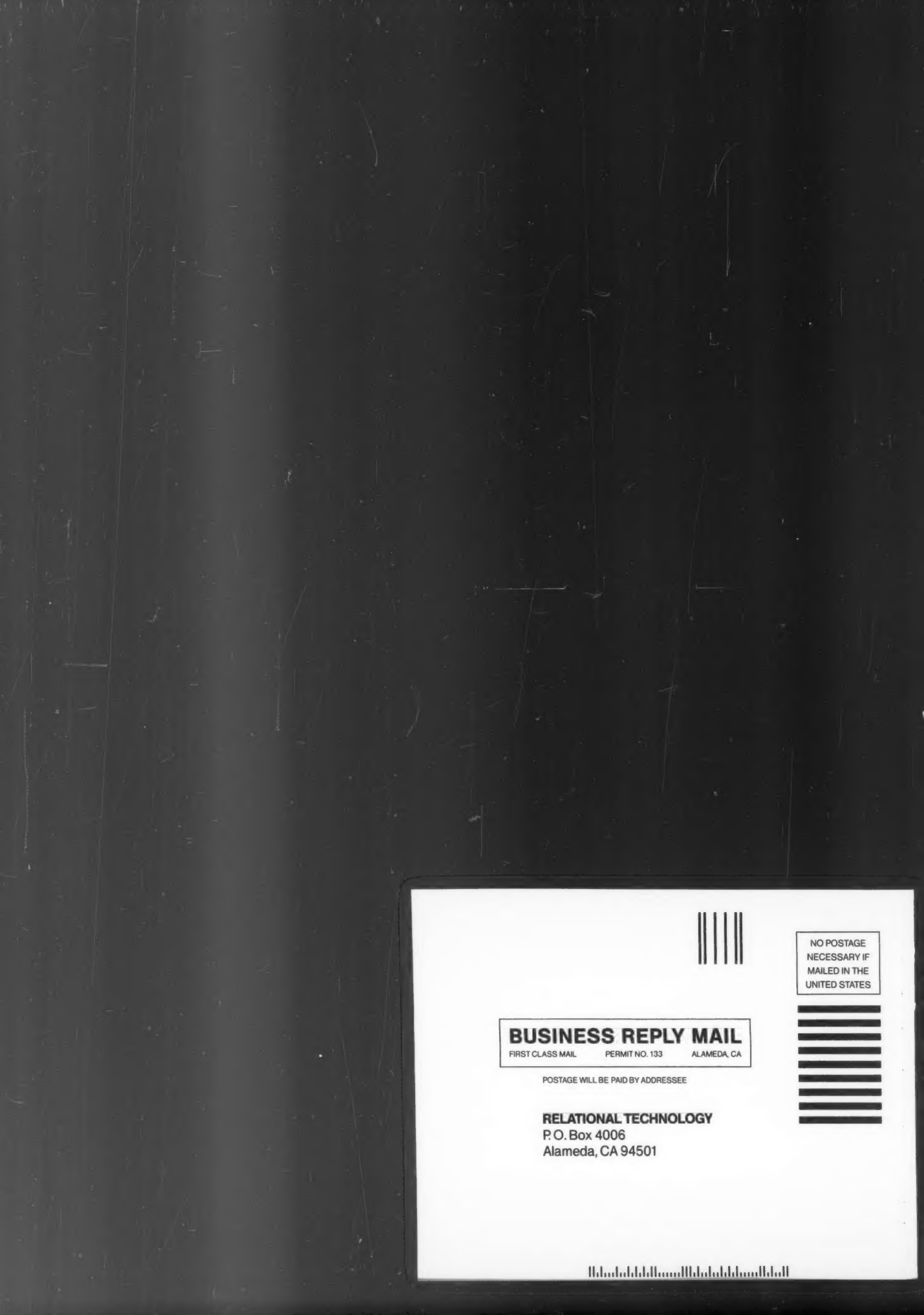
Are you currently evaluating a DBMS? ☐ Yes ☐ No
Plan to purchase: ☐ Within 60 days ☐ 3-6 months
☐ 6-12 months ☐ Uncertain/no specific plans

☐ I am not able to attend the seminar at this time, but would like more information on INGRES.

INGRES
RELATIONAL TECHNOLOGY

1080 Marina Village Parkway
Alameda, CA 94501
Call 1-800-4-INGRES (1-800-446-4737)
In Canada call (415) 748-3444

ASEM 801 CW


NO POSTAGE
NECESSARY IF
MAILED IN THE
UNITED STATES
BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 133 ALAMEDA, CA
POSTAGE WILL BE PAID BY ADDRESSEE
RELATIONAL TECHNOLOGY
P.O. Box 4006
Alameda, CA 94501

OUR NEW SEMINAR SHOWS YOU HOW THE POWER OF INGRES PUTS CORPORATE INFORMATION AT YOUR FINGERTIPS

ONLY INGRES RELATIONAL DBMS AND 4GL GIVE YOU THE SOLUTIONS YOU WANT ON THE COMPUTERS YOU USE

If you're in charge of MIS, or are involved in the evaluation and selection of a database system, here is your opportunity to learn about the most advanced integrated Relational DBMS and 4GL ever.

In just a few hours, you'll know more about how to evaluate today's systems than you ever knew before. Because, after that, you'll be comparing all other systems to INGRES's Total Performance Architecture™

Total Performance Architecture (TPA) combines Tools, Power, and Access for applications development, transaction processing, and seamless information access. INGRES can be implemented transparently across over 40 hardware and operating system platforms including DEC, IBM, and UNIX, from mainframes to PCs.

Through technical presentations, case-studies, and live demonstrations, you'll see how the features of each INGRES product meet the challenges of today's MIS department from applications design and prototyping through implementation and maintenance.

We'll present specific case-studies showing how INGRES has served the needs of thousands of companies worldwide by improving development productivity by a factor of five, reducing life cycle maintenance costs, and providing true applications portability.

So, if you're a decision-maker involved in evaluating and selecting database systems, come and see why Fortune 500 companies worldwide are using INGRES to meet their MIS needs.

Check the listing next to this ad for the dates and locations of the seminar nearest you. Then complete and mail the reply card. Or, for faster registration, **call 1-800-4-INGRES (1-800-446-4737). In Canada call (415) 748-3444.**

TOOLS

Minimize backlog and cost with 4GL Application Development Tools.

INGRES's powerful 4GL tools help a major consumer products company save on applications development costs. INGRES has the only full-function 4GL tools which are tightly integrated with our SQL RDBMS and are instantly portable across PC, UNIX, VAX, and IBM platforms. INGRES visual programming methods facilitate rapid prototyping and modification.

Access information faster and easier with INGRES Query and Reporting Tools.

INGRES Query and Reporting Tools are used by a telecommunications company. INGRES reduces the learning curve with easy-to-learn, "fill-in-the-form" interfaces which allow direct access to critical information. INGRES SQL also interfaces with popular programs like Lotus 1-2-3, so users can leverage existing knowledge to become productive right away.

POWER

Support OLTP applications with the INGRES Multi-Server™ Data Manager.

The INGRES Multi-Server Data Manager is the only Relational DBMS to provide scalable OLTP performance across single, clustered, multi-processor, or networked CPU configurations. With its unique AI-based Query Optimizer, INGRES helps one of the world's leading business and consumer electronics companies vastly improve overall system performance.

ACCESS

Apply INGRES RDBMS power to older file management systems with INGRES Gateways.

INGRES Gateways give a pharmaceutical company direct access to data trapped in an older file system and the ability to combine that data into new relational applications. INGRES Gateways allow access to data across different file formats (such as dBASE III and RMS). No other relational database offers these instant links to older data files.

Integrate islands of information into a distribut..l resource with INGRES/STAR.

Using INGRES/STAR, an international financial giant links information systems in the United States, Europe, and Japan. INGRES/STAR provides the most advanced distributed database management system available today and improves access while reducing complexity and costs for hundreds of applications from the shop floor to the board room.

INGRES
RELATIONAL TECHNOLOGY
1080 Marina Village Parkway, Alameda, CA 94501

INGRES Total Performance Architecture, INGRES Multi-Server, INGRES/QUERY, INGRES/STAR, INGRES/REPORTS, INGRES Gateway for dBASE III, and INGRES Gateway for RMS are trademarks of Relational Technology, Inc. dBASE II and dBASE III are trademarks of Ashton-Tate Corporation. DEC, VAX, and RMS are registered trademarks of Digital Equipment Corporation. IBM is a registered trademark of International Business Machines Corporation. Lotus 1-2-3 is a trademark of Lotus Development Corporation. UNIX is a trademark of AT&T.
© 1988 Relational Technology, Inc. Printed in U.S.A.

Circle Reader Service Number 30

CALENDAR

May 1-7

The 1988 National Conference on Managing DEC-IBM Integration. Chicago, May 3-4 — Contact: Gregg Martin, DeBoever & Associates, Inc., Suite 220, 179 Great Road, Acton, Mass. 01720.

May 8-14

Downsizing Corporate Information Systems: How Far Should You Go? Boca Raton, Fla., May 8-11 — Contact: Paula Zinck, International Data Corp., 5 Speen St., Framingham, Mass. 01701.

Doyle specializes in Competitive Prices & Professional Service

IBM • DEC

• All Models & Peripherals
• Upgrades - Features
• Quick Delivery
• New & Used
• Top Savings

SERIES/1

SYSTEM/36

SYSTEM/38

43XX

VAX 730, 750, 780
VAX 8XXX Series

• Cluster Hardware
• Disk Drives

ITT COURIER
MEMOREX

BUY • SELL • LEASE

Have equipment to sell? Call DOYLE today.

CALL TOLL FREE
1-800-426-3695
(1-800-IBM-DOYL)
In Minnesota 612/831-8313

DOYLE
Computer Marketing

Circle Reader Service Number 31

Upgrade, Repair, Maintenance, Troubleshooting of the IBM PC, XT, AT, PS/2 & Compatibles. Boston, May 9-11 — Contact: Personal Computer Group, The American Institute, 55 Main St., Madison, N.J. 07940. Also being held May 11-13 in Chicago.

Comdex/Spring '88. Atlanta, May 9-12 — Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Data Communications I: Basic Concepts. Chicago, May 10-11 — Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Zero Defect Software — Dream or Reality? New York, May 11 — Contact: Nordic Business Development Corp., Suite 400, 3 Landmark Sq., Stamford, Conn. 06901.

Toward Total Integration. Twinsburg, Ohio, May 11-12 — Contact: Allen-Bradley Co., 1201 South Second St., Milwaukee, Wis. 53204.

Software Contracts. Boston, May 12-13 — Contact: Battelle Seminars Program, P.O. Box C-5395, 4000 N.E. 41st St., Seattle, Wash. 98105.

Data Communications II: Systems & Applications. Chicago, May 12-13 — Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

May 15-21

The 1988 Annual Meeting and Conference of the Software Maintenance Association. Chicago, May 15-18 — Contact: SMA 1988 Chicago, P.O. Box 391432, Mountain View, Calif. 94039.

41st Annual International Communications Association (ICA) Conference & Exposition. Anaheim, Calif., May 15-20 — Contact: ICA, Suite 710, LB-89, 12750 Merit Drive, Dallas, Texas 75251.

Crimson Tech Annual Trade Show. Boston, May 16-17 — Contact: Diana Musto, Crimson Tech, 325 Vassar St., Cambridge, Mass. 02139.

The New England Business Conference. Boston, May 16-18 — Contact: Danieli & O'Keefe Associates, Inc., New England Business Conference Management, 75 Union Ave., Sudbury, Mass. 01776.

The Hammer Information Systems Conference. White Plains, N.Y., May 16-18 — Contact: Forum 88, Hammer and Co., 5 Cambridge Center, Cambridge, Mass. 02142.

The Third Annual Office Systems and Networks Dialogue. Boston, May 17-19 — Contact: May Giacalone, Wohl Associates, 555 E. City Line Ave., Bala Cynwyd, Pa. 19004.

Dexpo Spring '88. Cincinnati, May 17-19 — Contact: Expoconsul International, Inc., 3 Independence Way, Princeton, N.J. 08540.

The 1988 Hard-Copy Supplies Conference. Boston, May 18-20 — Contact: CAP International, One Snow Road, Marshfield, Mass. 02050.

Strategies & Disciplines for Software Engineering. San Jose, Calif., May 18-20 — Contact: Ashley Pearce, Gartner Group, Inc., P.O. Box 10212, Stamford, Conn. 06904.

CD-ROMs in Office Automation and Business. Arlington, Va., May 19 — Contact: Office Automation Society International, P.O. Box 374, 6348 Munhall Court, McLean, Va. 22101.

Automated Data Base Design Tools. Atlanta, May 19-20 — Contact: Digital Consulting, Inc., 6 Windsor St., Andover, Mass. 01810.

May 22-28

Essential Systems Development: A Fourth-Generation Methodology. Los Angeles, May 23-25 — Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

Document Management Systems Conference. Stockholm, May 25-27 — Contact: Information Management Congress, 345 Woodcliff Drive, Fairport, N.Y. 14450.

Third Annual Lotus Developer Conference '88. Boston, May 25-27 — Contact: Lotus, 55 Cambridge Pkwy., Cambridge, Mass. 02142.

California Computer & Graphics Show. Palo Alto, Calif., May 26 — Contact: Norm De Nardi Enterprises, Suite 204, 289 South San Antonio Road, Los Altos, Calif. 94022.

May 29-June 4

QNX '88 — International Users Group Meeting. Ottawa, June 1-3 — Contact: Susan Tippett, Quantum Software Systems Ltd., 175 Terrence Matthews Crescent, Kanata, Ont., Canada K2M 1W8.

Software developers get Mac, VAX language link

Apple Computer, Inc. Macintosh developers have a new connectivity language from Network Innovations Corp., headquartered in Cupertino, Calif., that can talk to a Digital Equipment Corp. VAX data base. Based on IBM SQL, the language is called CL/1, and it serves as a link between Apple's Hypercard applications and DEC VAX minicomputers.

With CL/1, software developers reportedly can build VAX-connected applications without writing VAX software. Network Innovations said that CL/1 supports RDB, which is DEC's relational data base management system, Oracle Corp.'s Oracle, Relational Technology, Inc.'s Ingres, Sybase, Inc.'s data bases and DEC's VAX RMS data files generated by Cobol and Fortran.

Companies that have demonstrated CL/1 capabilities in their Macintosh applications include Acius, Inc., Ashton-Tate Corp., Blyth Software, Inc. and Lotus Development Corp.

The CL/1 developer's tool kit includes an application program interface (API), developer tools for the Macintosh and a copy of the CL/1 server for DEC's VAX/VMS.

According to the vendor, there is also a redistribution license for the CL/1 API that allows developers to distribute CL/1 as a standard part of their Macintosh applications without charge. The tool kit is priced at $35,000 and includes one year of technical support.

The CL/1 server for VAX/VMS is installed on each VAX system that has a CL/1 connection. Prices for the CL/1 server begin at $3,000 for a DEC Microvax II and go up to $23,975 for a DEC Vaxcluster 8978. — HELEN PIKE

Circle Reader Service Number 116

Openview

Continued from page 59

Openview will continue to incorporate future OSI modifications to enable the integration of multivendor systems into the network management system.

OSI is integral to Openview and to HP's overall network management strategy. HP abandoned its proprietary approach to networking a few years ago and declared OSI the way of the future, placing the standard at the center of its subsequent network product development.

"Openview, to me, represents a different approach [from IBM's Netview] to network management," declared Jack Freeman, senior analyst of data communications at the Yankee Group in Boston. "Openview stresses the selection of data culled from various networking data bases, then massaged in the PC Windows environment, then presented to chief information officers to analyze overall network efficiency and justification. It doesn't emphasize the kind of nuts-and-bolts performance and response time monitoring that other network management systems, such as Netview, stress."

Freeman said that HP might also be assuming a sort of elder statesman role, whereby the vendor can become an influential and high-profile U.S. promoter of OSI in network management.

"Once OSI becomes widespread, people will scramble looking for good network management software for OSI systems," Freeman explained. "HP is aiming to be in the position of providing it."

Along the way, HP will likely try to garner third-party network vendor support. By gathering backing, HP hopes to produce enough enhancements and extensions to Openview to eventually put it in a position to go to OSI standards committees and declare that "we have a few [network management] suggestions, and we also have some support for them," Freeman said.

OSI comes first

"Down the road, HP could be in a very good position with regard to network management," Freeman added. "IBM and Digital Equipment Corp. support OSI, but as an adjunct to their product development. For instance, when DEC introduces a network enhancement, they do it first to [their own] Decnet network, then to OSI. HP does everything for OSI first, however, and that will be a strength later on."

For the short term, Freeman said that Openview could even win support outside HP's user base from those firms seeking the broad network reporting features Openview offers that IBM and other vendors do not.

Actually, these features are not yet fully available. The Openview Windows user interface, the Status and Diagnostic Monitor software, the Performance Monitor software and the ITIMS manager software will not be available until the end of 1988 Only the Network Command Interpreter software is available now. — STAN KOLODZIEJ

Circle Reader Service Number 117

Blue Beat

Continued from page 59

supports and provides maintenance service for non-IBM equipment.

There is, as always with IBM, a catch: The company will only do this in cases in which the customer's business solution is predominantly IBM based (the IBM rule of thumb is up to 25% third-party content by value). Still, IBM's process has proved attractive to a number of large end users who are putting in major IBM installations and who want some degree of customization and third-party product content. The list of customers for whom IBM has performed systems integration projects makes up an impressive roster: Ford, United Airlines, Mobil, Sears, Hospital Corporation of America, Equitable Life Insurance Co., Lockheed, Wells Fargo and so on.

At the low end of the spectrum, IBM is performing smaller systems integration projects routinely, and now has approximately 1,300 people in 47 locations nationwide to handle these projects through an organization called IBM Information Services Systems Integration and Professional Services (abbreviated as IIS-SI/PS, which is not much of an improvement).

Supporting the systems integration effort is a custom products infrastructure. There is an organization called the IBM Custom Workstation Laboratory that will cheerfully modify RT Personal Computers, Personal Computer ATs and Personal System/2s per customer requirements. There are IBM product lines available on a custom basis with names like Image Application Systems and Integrated Diagnostics. Moreover, all of IBM's Industry Marketing functions now have custom design teams in place, while the Application Systems Division has almost 600 engineers and programmers available. The Systems Division prides itself on the 500 or so people available for commercial projects.

Not to be left out, the new IBM Communications Systems unit is setting up its own group to handle private network systems integration projects. Communications Systems has 400 or so systems engineers just dying to custom-design networks for end users. It has also been putting together a new structure that includes bits of the Federal Systems Division, the Rolm Corp. organization, the Information Network, the National Service Division and IBM international units for a total of a couple of thousand more custom network people. Communications Systems has also taken to using its petty cash (it has a lot of petty cash) to buy up outfits like Pactel Spectrum Services, which gives the division further network management expertise.

Soup to nuts

The whole thing is obviously being taken seriously by IBM. The company is turning itself, as far as large end users are concerned, into a turnkey solutions supplier. IBM, in short, will sell you products, implement them, drown you in programmers and support people and, with a little notice, put in a cradle-to-grave, soup-to-nuts, integrated data/text/graphics/image/voice, multivendor, industry-specific, global enterprise solution serviced 24 hours a day, seven days a week from here to Bangladesh.

The tendency is to pooh-pooh this. Large MIS shop managers say they are not impressed. ("What, me be systems integrated? Never!") Competitors tend to sniff and regard it as another IBM aberration. Even ADAPSO hasn't got upset about it, which isn't entirely unjustified: IBM has made more than a few mistakes in its pursuit of systems integration business.

Still, it may be unwise to assume that IBM is off base. The firm is responding to real market demands for customization, complex solutions and multivendor integration, and so far, it is the only major systems vendor to offer project-based systems integration to commercial users.

IBM also has an edge that many (including MIS) may tend to forget: the sheer size of the IBM base of systems and software. It would be impossible for many end users to handle any large-scale systems project without involving IBM in some form, and where a project involves a high level of IBM content, IBM's willingness to help has a certain insidious charm.

Then there is the sheer weight of resources IBM is putting behind its systems integration drive. They are not small, even by IBM standards. Anything that is being targeted that seriously by so powerful a company deserves a little thought. A 600-lb gorilla is, after all, still a 600-lb gorilla.

Jeffery is managing director of the International Technology Group, a management consulting and market research firm in Los Altos, Calif.

Advertisers Index

Page No.	Advertiser
40-41	Arthur Andersen & Co. *312-507-5161*
32-33	AT&T *800-222-0400*
34	Attachmate Corp. *800-426-6283;206-644-4010 in WA*
10	C&B Software *800-248-3270;714-676-5323 in CA*
C2	Codex Corporation *800-426-1212,x250*
36	Command Technology Corp. *415-339-3530*
58	CW International *617-879-0700*
22	Datagram *401-885-4x40 in RI;514-655-3200 in CN*
2-3	Digital Equipment Corp.
62	Doyle Computer Marketing, Inc. *800-IBM-DOYL;612-831-8313 in MN*
8-9	Duquesne Systems *800-323-2600;412-323-2600 in PA*
38	Eastman Kodak *800-445-6325,x300*
44	Electrohome Limited *800-265-2171;519-744-7111 in CN*
52	Electrovep *516-752-0585*
20	Encore International, Inc. *313-645-5353*
54	Enterprise Networking Event '88 *313-271-1500*
14	Ficomp, Inc. *215-997-2600 in PA;201-738-3737 in NJ*
63	FTP Software, Inc. *617-868-4878*
50	Gandalf Dat a Inc. *800-GANDALF;312-541-6060 in IL*
43	Harris Computer Systems *800-4-HARRIS,x4041*
4	Hayes Microcomputer Products Inc. *800-635-1225*
C3	Informix Software *415-322-4100*
46	JDS Microprocessing *714-770-2263*
19	Joiner Associates, Inc. *608-238-8637*
26	Lachman Associates, Inc. *800-LAI-UNIX;312-505-9100 in IL*
49	Local Data *800-267-1821 in CN;213-320-7126 in CA*
24-25	Memorex Telex *800-331-2623,x4530;918-624-4530 in OK*
56-57	Network Equipment Technologies *800-235-6935,Dept. M86*
48	Persoft, Inc. *608-273-6000*
C4	Quantum Software Systems Ltd. *613-591-0931*
61	Relational Technology *800-446-4737;415-748-3444 in CN*
23	Renex *703-494-2200*
18	Siemens Information Systems Inc. *800-327-0636*
11	Softbox *800-FOR-INFO*
53	Synoptics Communications Inc. *415-960-1100*
30-31	Tangram Systems Corp. *919-481-4444*
7	TOPS *800-445-TOPS in CA;800-222-TOPS;415-549-9700*
12	Unipex *800-356-8063*
15	Wintehalter Inc. *313-662-2002*

This index is provided as an additional service.
The publisher does not assume any liability for errors or omissions.

SALES OFFICES

Publisher Fritz Landmann

Vice President/Associate Publisher/Val Landi, *COMPUTERWORLD* 375 Cochituate Rd., Box 9171, Framingham, MA 01701-9171, (617) 879-0700

BOSTON: Northern Regional Manager/David Peterson, *District Managers*/Bill Cadigan, Sherry Driscoll, *Account Manager*/John Watts, *Sales Assistant*/Alice Longley, *COMPUTERWORLD*, 375 Cochituate Rd., Box 9171, Framingham, MA 01701-9171 (617) 879-0700

CHICAGO: Midwest Regional Manager/Kevin McPherson, *District Manager*/Larry Craven, *Sales Assistants*/Kathy Sullivant, Karol Lange *COMPUTERWORLD*, 10400 West Higgins Road, Suite 300, Rosemont, IL 60018, (312) 827-4433

NEW YORK: Eastern Regional Director/Bernie Hockswender, *District Managers*/Fred LoSapio, Frank Genovese, *Account Manager*/Paula Smith, *Sales Assistants*/Mary Tagliareni, Sue Larson, Eileen Lobaugh, *COMPUTERWORLD*, Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652 (201) 967-1350

LOS ANGELES: Western Regional Director/Mark V. Gasner, *District Managers*/Carolyn Knox, Gary Hooks, *COMPUTERWORLD*, 18004 Sky Park Circle, Suite 255, Irvine, CA 92714 (714) 261-1230

SAN FRANCISCO: Western Regional Director/Mark V. Gasner, *Senior District Manager*/Ernie Chamberlain, *District Managers*/Jan Harper, Michela O'Conner, *Account Manager*/Alicia Saribalis, *Sales Assistants*/Christina Werthorst, Robert Condenso, *COMPUTERWORLD*, 500 Airport Blvd., Suite 400, Burlingame, CA 94010 (415) 347-0555

ATLANTA: Eastern Regional Director/Bernie Hockswender, *Southeastern Regional Manager*/Kevin C. Harold, *Sales Assistant*/Melissa Christie, *COMPUTERWORLD*, 1400 Lake Hearn Dr., Suite 330, Atlanta, GA 30319 (404) 394-0758

DALLAS: Eastern Regional Director/Bernie Hockswender, *Southeastern Regional Manager*/Kevin C. Harold, *COMPUTERWORLD*, 14651 Dallas Pkwy., Suite 304, Dallas, TX 75240 (214) 233-0882

WASHINGTON, D.C.: Eastern Regional Director/Bernie Hockswender, *COMPUTERWORLD*, 3022 Javier Rd., Suite 210, Fairfax, VA 22031 (703) 280-2027

PRODUCT CLASSIFIED ADVERTISING: Product Classified Advertising Director/Debbie Eisenberg, Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652 (201) 967-1350

RECRUITMENT ADVERTISING: National Recruitment Sales Director/John Corrigan, 375 Cochituate Rd., Box 9171, Framingham, MA 01701-9171 (617) 879-0700

RECRUITMENT ADVERTISING SALES OFFICES:
New England Recruitment Manager/Al DeMille, 375 Cochituate Rd., Box 9171, Framingham, MA 01701-9171 (617) 879-0700

Mid-Atlantic Recruitment Manager/Warren Kolber, Paramus Plaza 1, 140 Route 17 North, Paramus, NJ 07652 (201) 967-1350

Midwest Recruitment Manager/Patricia Powers, 2600 South River Rd., Suite 304, Des Plaines, IL 60018 (312) 827-4433

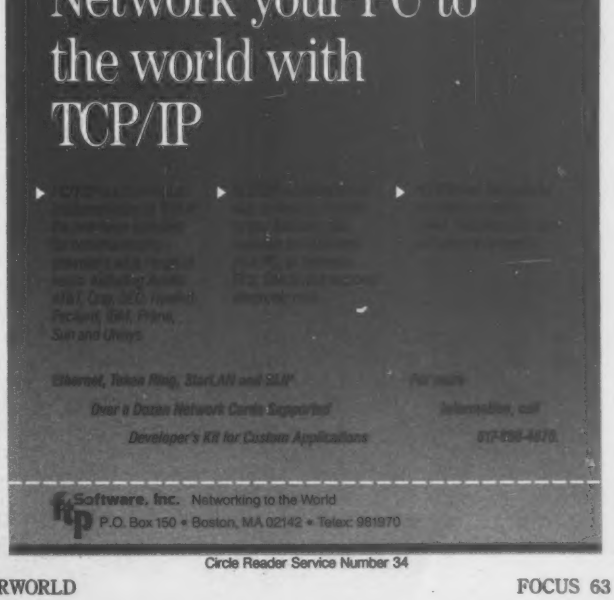
Western Recruitment Manager/Barbara Murphy, 18004 Skypark Cicrle, Suite 100, Irvine, CA 92714 (714) 250-0164

South-Atlantic Recruitment Manager/Kathryn Kress, 3022 Javier Road, Suite 210, Fairfax, VA 22031 (703) 573-4115

Recruitment Telemarketing Account Executives: New England/Nancy Percival, *New York*/Jay Novack, *Mid-Atlantic*/Pauline Smith, *Midwest*/Ellen Casey, *Western*/Chris Glenn, 1-800-343-6474 or (617) 879-0700

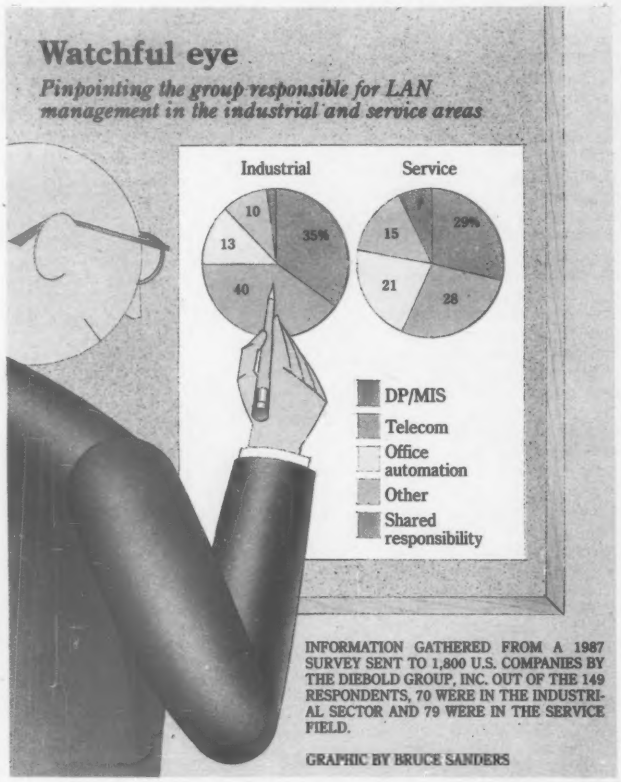
IDG INTERNATIONAL MARKETING SERVICES:
Managing Director/Frank Cutitta, *COMPUTERWORLD*, 375 Cochituate Rd., Box 9171, Framingham, MA 01701-9171 (617) 879-0700

West Coast Marketing Manager/Leslie Barner, 3350 West Bayshore Rd., Suite 201, Palo Alto, CA 94303 (415) 424-1001



Circle Reader Service Number 34

log off



OF INTEREST

"LANs should not be treated as a commodity. They're as complex as mainframes. Vendors should price them higher because they have the functions and horsepower of a minicomputer."

MARK I. FREUND
INTERCONNECT NETWORK CONSULTING GROUP, INC.

See story page 16

next issue

Personal computing and MIS are finally managing to coexist peacefully. June's *Computerworld Focus* looks at this delicate detente. We'll check out how executive information systems are gaining corporate influence and discover whether workstations stand to depose the boss's personal computer. Meanwhile, another struggle is ensuing as IBM and DEC try for a piece of Apple's action in the educational market. In addition, follow the rise, fall and regrouping of artificial intelligence applications in our Special Section. Stay on top of the latest PC news on graphical interfaces, X Windows, CD-ROM technology and more in next month's *Focus.*

IBM's great leap forward

Michael D. Millikin

The move to distributed network computing is the next architectural Great Leap Forward. Much of the impetus comes from the increasing power on our desktops. Desktop processors already are pushing toward and breaking double-digit million instructions per second performance. In the next few years, the entry-level price for these brawny boxes will drop. Distributed network processing will help exploit the aggregation of cycles across the network that otherwise would lie dormant.

Distributed network computing transparently distributes computational and data management across a heterogeneous group of computers. The best known model of this, perhaps, is Apollo Computer's Network Computing System (NCS). Digital Equipment, too, has a scheme for this, as seen in its Local Area Vaxcluster.

THE INSIDER

Another vendor has just jumped into this particular development ring — IBM. In conjunction with its recent set of announcements on AIX, its implementation of Unix, Big Blue also announced the Transparent Computing Facility (TCF).

TCF reportedly allows the distribution of data and processes among up to 31 different TCF nodes. Currently, a TCF node is an AIX/370 virtual machine or an IBM Personal System/2 Model 80 with an AIX PS/2 TCF program.

Location of data and processes is transparent to application programs and end users. Log on to one node, and the entire collection of 31 nodes can appear as a virtual local resource. Dynamic reconfiguration permits the addition or removal of nodes without affecting the cluster's operation. The cluster will also dynamically reallocate cycles across the network based upon resource constraints at a given time.

IBM's Systems Application Architecture (SAA) sets up a blueprint for creating a distributed computing architecture across the IBM product lines. Given the different operating systems, this is an Augean task, but one IBM will achieve.

Now that IBM has recognized the potential of Unix, it is pouring resources into this business area. But it does not plan just to tag along with the pack of minimum conformers to Unix standards. Nor is it constrained by jumping through SAA hoops. (There are well-defined points of intersection, however. IBM no longer is in the business of creating isolated systems solutions.)

Hence, IBM can blast ahead with something like TCF, without worrying about how to implement it on a variety of operating systems.

Many current implementations of distributed network computing are in scientific and engineering environments. IBM's AIX and TCF, while targeted at those markets, are also directed squarely at the commercial side of business. Not only has IBM's bolstered AIX given yet another shove to the fast-moving Unix movement, but TCF has a good chance of hastening distributed network computing on the commercial side.

Millikin is vice-president and senior analyst with Patricia Seybold's Office Computing Group in Boston.

Now available on OS/2.

The problem with most 4GLs is they're finished before you are.

And where does that leave you?

With the final, tricky ten percent of your application yet to write, and no 4GL left to write it with. Sound familiar?

If so, try INFORMIX®-4GL.

Never again will you have to switch to C or COBOL to truly customize your application. Instead, INFORMIX-4GL provides an all encompassing syntax for every aspect of your application building.

So once you're programming in INFORMIX-4GL, you never have to leave it. And considering all it can do, you may never want to.

Now, for instance, you can write in just ten to twenty pages of 4GL code, applications that would take hundreds of pages with C.

That's because INFORMIX-4GL was designed from the start to be an application building language. It's built around the full implementation of ANSI Standard SQL. And features Custom Screen Generation, Custom Menu Building, a built-in Report Writer and Windows.

What's more, INFORMIX-4GL works with UNIX,™ VMS,™ MS™-DOS and Networked DOS operating systems. And, of course, it's compatible with INFORMIX-SQL—our popular, proven DBMS. So files you build with one, you can access with the other.

For more information and our free booklet, "A 20-Minute Guide to INFORMIX-4GL," call 415/322-4100.

Or write Informix Software, 4100 Bohannon Drive, Menlo Park, CA 94025.

And start taking your applications to even greater heights.

INFORMIX is a registered trademark of Informix Software, Inc. Other names identified by TM are tradenames and/or trademarks of their respective manufacturers. © 1987, Informix Software, Inc.

INFORMIX

The RDBMS for people who know better.™

QNX vs. OS/2 UNIX

QNX: Bend it, shape it, any way you want it.

ARCHITECTURE If the micro world were not so varied, QNX would not be so successful. After all, it is the operating system which enhances or limits the potential capabilities of applications. QNX owes its success (over 30,000 systems sold since 1982) to the tremendous power and flexibility provided by its modular architecture.

Based on message-passing, QNX is radically more innovative than UNIX or OS/2. Written by a small team of dedicated designers, it provides a fully integrated multi-user, multi-tasking, networked operating system in a lean 148K. By comparison, both OS/2 and UNIX, written by many hands, are huge and cumbersome. Both are examples of a monolithic operating system design fashionable over 20 years ago.

MULTI-USER OS/2 is multi-tasking but NOT multi-user. For OS/2, this inherent deficiency is a serious handicap for terminal and remote access. QNX is both multi-tasking AND multi-user, allowing up to 16 terminals and modems to connect to any computer.

INTEGRATED NETWORKING Neither UNIX nor OS/2 can provide integrated networking. With truly distributed processing and resource sharing, QNX makes all resources (processors, disks, printers and modems anywhere on the network) available to any user. Systems may be single computers, or, by simply adding micros without changes to user software, they can grow to large transparent multiprocessor environments. QNX is the mainframe you build micro by micro.

PC's, AT's and PS/2's OS/2 and UNIX severely restrict hardware that can be used: you must replace all your PC's with AT's. In contrast, QNX runs superbly on PC's and literally soars on AT's and PS/2's. You can run your unmodified QNX applications on any mix of machines, either standalone or in a QNX local area network, in real mode on PC's or in protected mode on AT's. Only QNX lets you run multi-user/multi-tasking with networking on all classes of machines.

REAL TIME QNX real-time performance leaves both OS/2 and UNIX wallowing at the gate. In fact, QNX is in use at thousands of real-time sites, right now.

DOS SUPPORT QNX allows you to run PC-DOS applications as single-user tasks, for both PC's and AT's in real or protected mode. With OS/2, 128K of the DOS memory is consumed to enable this facility. Within QNX protected mode, a full 640K can be used for PC-DOS.

ANY WAY YOU WANT IT QNX has the power and flexibility you need. Call for details and a demo disk.

THE ONLY MULTI-USER, MULTI-TASKING, NETWORKING, REAL-TIME OPERATING SYSTEM FOR THE IBM PC, AT, PS/2, THE HP VECTRA, AND COMPATIBLES.

Multi-User	10 (16) serial terminals per PC (AT).	**C Compiler**	Standard Kernighan and Ritchie.
Multi-Tasking	40 (64) tasks per PC (AT).	**Flexibility**	Single PC, networked PC's, single PC with terminals, networked PC's with terminals. No central servers. Full sharing of disks, devices and CPU's.
Networking	2.5 Megabit token passing. 255 PC's and/or AT's per network. 10,000 tasks per network. Thousands of users per network.	**PC-DOS**	PC-DOS runs as a QNX task.
Real Time	2,800 task switches/sec (AT).	**Cost**	From US $450. Runtime pricing available.
Message Passing	Fast intertask communication between tasks on any machine.		

QNX

For further information or a free demonstration diskette, please telephone (613) 591-0931.

Quantum Software Systems Ltd. • Kanata South Business Park • 175 Terrence Matthews Crescent • Kanata, Ontario, Canada • K2M 1W8

UNIX is a registered trademark of AT & T Bell Labs. IBM, PC, AT, XT and PS/2, PC-DOS and OS/2 are trademarks of International Business Machines. HP and Vectra are registered trademarks of Hewlett-Packard Company.